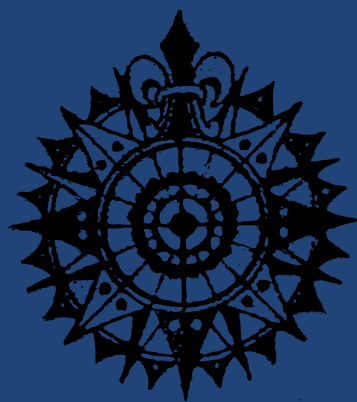


Alexander Kondratov

THE RIDDLES OF THREE OCEANS



Alexander Kondratov

**THE
RIDDLES
OF
THREE
OCEANS**

Progress Publishers. Moscow



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First printing 1974

© Translation into English. Progress Publishers 1974

*Printed in the Union
of Soviet Socialist Republics*

K $\frac{20901-495}{014(01)-74}77-74$

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EPILOGUE

FOREWORD

One of the most difficult problems faced by the scientific investigator, no matter what his particular field, is that of elucidating the origins of things and the lines along which they have developed to reach their present state. These are usually shrouded in the mists of time. When it comes to a study of man and human society, probably the most complicated subject in the whole Universe, the problems that arise are staggering.

We know that man appeared on earth more than a million years ago, but we still do not know exactly where. The human race multiplied and spread over the continents. As new regions were settled and developed, tribes and peoples took shape, civilisations arose and declined. More often than not, these processes remain a mystery to scholars.

Written records throw light only on minute periods of history, while information relating to the preceding periods is indirect, fragmentary and often hazy. Here, even myths and legends can help because many have some foundation in fact. Scholars can sometimes obtain valid information by comparing the languages of different peoples and also by analysing place-names. The historian's most reliable helper is archeology, which deals with traces of material culture, in other words, with highly objective evidence.

Until now, most of the contributions to our knowledge of ancient peoples and civilisations have been made by "land" archeology. Today, more and more traces of man are being discovered under water as well. Archeologists discover artifacts, sunken ships and even ruins of settlements and cities as much as two kilometres below the surface.

Although finds made at the bottom of lakes or coastal waters are usually supplementary to those made on land nearby, scholars have gradually outlined a range of problems in which underwater archeology can play an independent role, moreover, a decisive role. For instance, in explaining how it is that habitats of the equatorial race (tropical Africa and Australia, say) are separated by the expanses of the

Indian Ocean. Or the similarity between ancient monumental structures found in places so far apart as Easter Island and Pitcairn Island. The scholar cannot help assuming that land bridges, in the form of chains of islands or stretches of dry land, once linked these widely scattered places but then sank below the waves.

Here archeology comes into close contact with geology: the former combs the ocean floor for artifacts and dates them; the latter seeks evidence of subsidences of the earth's crust and establishes in which periods of geological time they occurred. When the findings of the two sciences agree, highly reliable conclusions can be drawn.

In this book Alexander Kondratov takes a look at some of the blank spaces in man's knowledge that can be filled in by further evidence obtained from underwater archeology. In the Pacific Ocean these include such riddles as the culture of Easter Island, the origin of the American Indians, the original homeland of the Polynesians and the peopling of Australia. In the Indian Ocean one of the mysteries is how the ancient Dravidian civilisation spread. Among the secrets of the Atlantic are the warm and cold legendary islands of St. Brendan, Antilia and Thule, the extinct tribes of the Canary Islands, and Atlantis, a fascinating mystery that has given rise to a voluminous body of literature.

The author sets forth the main hypotheses that have been advanced to solve these riddles and analyses them from the standpoints of ethnography, linguistics, geology and other sciences. But he does not try to impose any of the hypotheses on the reader. The conclusions he draws are extremely cautious, and in cases where there is insufficient data the question is left open.

This highly interesting book is intended for the general reader. Indeed, no educated person can fail to take an interest in problems that have a direct bearing on the human race.

Academician S. Kalesnik

PROLOGUE

Man's discovery of the world can be divided into three main stages. The first relates to prehistoric times, when primitive tribes were spreading across the globe. The second is the Age of Great Geographical Discoveries, from the 15th to the 18th centuries, when Spanish, Portuguese, English, French and Russian seafarers and travellers mapped new countries, seas, islands, mountain ranges and deserts. The third covers the 19th and 20th centuries, the Age of Great Historical Discoveries.

Until the 19th century the only written records which European historians and philosophers had on early history were the Bible and the works of the historians of antiquity. But after the Egyptian hieroglyphic and Mesopotamian cuneiform scripts were deciphered the stream of source material swelled into a flood. The scholar of today has literally no time to read everything that has come down to us. In the Middle Ages the Bible was accepted without question. The sceptical 18th century regarded biblical accounts as fairy-tales. Today, Orientalists consider the sacred book of Christianity and Judaism a magnificent historical document—although requiring a special approach. Every proper name, geographical name, event and date in the Bible has to be deciphered, as it were, since actual happenings, personages, peoples and cities are refracted through a "prism of myths" enveloped in fantasy or poetry.

The creativity and mythopoetic gifts of Judean preachers, prophets and poets over many centuries, beginning with the 13th century B.C., went into the making of the Bible. The Bible absorbed myths and legends of the more ancient culture of Mesopotamia, reflected actual events of that

period in the Middle East, and, as all sacred writings should, presented a universal picture of the world from its inception to its imminent end.

The "deciphering" of biblical evidence has helped scholars to establish many historical events. Other sacred literature provides equally valuable source material. (Like the Bible this literature has to be painstakingly "deciphered".) Take, for example, the Veda, the sacred books of the Hindus, particularly the *Rig-Veda*, the oldest, longest and most interesting of the books; the *Avesta*, the sacred book of the Parsic fire worshippers; the *Popol Vuh*, or Book of the Peoples of the Quiche; and the many myths, legends, and fairytales of the most diverse peoples. If we make allowances for the "prism of myths" through which actual events were refracted, all this can be a splendid record that helps us to pierce the veil of time.

In the course of their work on ancient writings and sacred books, philologists came into contact with a great many languages. Reading the *Rig-Veda* and *Avesta*, they discovered that ancient Hindu and Persian words were astonishingly similar to words in the Greek, Latin, French, Spanish, Lithuanian, Russian and other languages, in short almost all European languages, including Swedish, Norwegian and Icelandic. The similarity of words and roots was not accidental. It showed the ancient kinship of the languages that became known as the Indo-European family. The discovery laid the foundation of a new science, historical and comparative linguistics.

Furthermore, this discovery proved just as important to the science of history. It showed that not only *texts* but *language* itself, its grammar and, particularly, vocabulary, can be an excel-

lent historical source, moreover, a source that has not been "edited" by rulers, priests, officials or scribes.

Language data enable the historian to look far back to periods when written language did not yet exist and which have not left any other material evidence. There are cases when the words of a language can take the place of the archeologist's spade and the annals of ancient chroniclers.

Where was the birthplace of the Indo-European languages, and therefore of the tribes that spoke a single "parent Indo-European language" (or cognate dialects, as many scholars believe)? What was their cultural level? What were their occupations? Indo-European unity broke up long before writing was invented. Archeology, too, is still powerless to help. None of the cultures found on the vast expanses of Eurasia can be authentically linked to the Indo-Europeans. All that is left are linguistic data. By comparing words of the different Indo-European languages and searching for the oldest stratum of a common vocabulary, philologists have been able to tell historians a great deal.

For instance, "language archeology" has revealed that while the Indo-Europeans knew the rudiments of agriculture the similarity in the names of domestic animals, including differentiated names—separate names for cow, calf, sheep, lamb, horse, colt and so on—shows that their chief occupation was cattle-raising.

The discovery of this fact enabled scholars to narrow considerably the search for the original Indo-European homeland. It could not be the forests of Lithuania or the island of Ireland, as some scholars had supposed. The plains bordering on the Black Sea or the plains in Central

Asia appeared to be a more natural place. The latest findings in linguistics tell us that the most likely area is Asia Minor. For it has been found that some Caucasian languages and the Semitic languages have words in common that could not have been borrowed, since they belong to the basic vocabulary. This shows an underlying kinship of the above languages, and also that the most suitable territory for their "coexistence" was Asia Minor.

Since languages change it is obvious that the earlier the stage at which the historian finds a language the more valuable the information he can obtain from it. Discovery of the secret of ancient scripts has enabled scholars to study more than thirty centuries of the Greek language. (It was inscribed on clay tablets one thousand years before Homer!) The history of the Egyptian and the Akkadian languages covers an equally long span. Whole branches of Indo-European languages that have vanished from the face of the earth have been brought to light, as have new families of languages like the Hurri Urartic language that was spoken in Mitanni and Urartu, great kingdoms of the ancient East.

The historian widely uses ancient texts and the data provided by the vocabularies of cognate languages. But if he has neither texts nor vocabularies he can turn to toponymy, a science that combines history with linguistics and geography, for help. The names of cities, settlements, mountains and, particularly, rivers endure after countries, peoples and languages have vanished. No wonder they are sometimes called "history on the surface of the map". The names of the rivers Don, Dnieper, Danube, Dniester and Donets tell us that Scythians once lived on the territory of Southern

Europe and along the Black Sea, for the Scythian word "don" means "water" or "river".

Toponymy is helping modern scholars to make new discoveries in such thoroughly studied fields as the history of the ancient world. They have found, for example, that Greece and the islands of the Aegean Sea were once inhabited by peoples (or one people) who spoke a language which has nothing in common with the Indo-European languages and has been tentatively named "Aegean". Then the Hittites and other kindred peoples penetrated into the Aegean area from the east. Next, or perhaps at the same time, from the north came the Pelasgians, whose language was cognate with the now vanished Thracian language, the native tongue of the famous Spartacus. The first Greeks appeared in the Aegean area around 2000 B.C. An analysis of geographical names has enabled scholars to distinguish four strata belonging to four different cultures and peoples: the Aegean, Hittite, Pelasgian and Greek.

These strata emerge not only from an analysis of place-names, of course. But toponymy helps historians to determine to which ethnos inhabitants of the Aegean area belonged. The excavations carried on in Greece and the Aegean Islands through the centuries have brought to light thousands of material records left by their early inhabitants.

Excavations there began in antiquity, when collecting became a passionate hobby of wealthy men of the Hellenic kingdoms and the Roman empire. Actually, it was not excavation as we understand the word. It was sooner plunder of ancient Greek temples, tombs and burial vaults. In the Middle Ages all material records of antiquity were considered "pagan" and were barbar-

ously destroyed. But the Renaissance brought with it a remarkable revival of interest in classic culture, and excavation started again. Unfortunately, the chief purpose was to find statues, bas-reliefs and other works of art, or at any rate, coins and inscriptions. Nothing else interested collectors and connoisseurs of antiquity.

Early in the 18th century the ruins of the Roman town of Herculaneum, which had been buried by an eruption of Mt Vesuvius, were uncovered. Pompeii, a city buried by the same eruption, was discovered in the middle of the same century. By forcing scholars to pay careful attention to every detail, to each seemingly insignificant object, the excavation of these towns, which went on for many years, stimulated the establishment of modern methods of archeological excavation. In the second half of the 18th century Eduard Winkelmann, a brilliant authority on the culture of antiquity, was able to link up passages from ancient writings with works of art unearthed by archeologists. He showed that the history of art styles was inseparably connected with the overall cultural development of the lands of classical antiquity. (That is why Winkelmann is sometimes called both "the father of archeology" and "the father of the history of art".)

In the second half of the 19th century archeologists carried out a series of excavations on the territory of ancient Greece and "hellenised" Asia Minor; they restored Olympia, sacred site of the ancient Olympic games, where they discovered 130 marble statues and bas-reliefs, 1,000 inscriptions, 6,000 coins, 13,000 bronze objects, and many thousands of terra-cotta objects. Digging went on at Athens and Delphi. Pergamum yielded its famous altar. At Halicarnassus they found one

of the seven wonders of the world, the monumental tomb of King Mausolus of Caria.

While archeologists were working with philologists and historians to reconstruct the world of classical antiquity, Heinrich Schliemann, enthusiastic archeological amateur and a dedicated admirer of Homer, discovered an entirely new culture, one that preceded classical antiquity by many centuries.

Monuments of that civilisation are still being found. Each new archeological expedition produces unexpected results, forcing us to view Aegean history from a new angle. Yet this appeared to be the best studied area. So it is natural that historians and archeologists could make still more unexpected discoveries elsewhere.

The Egyptian pyramids were known to writers of antiquity as "the world's first wonder". After the brilliant French scholar François Champollion found the key to the mysterious hieroglyphics of the land of the pyramids (1822), Egyptology was born. This new science resurrected a unique, ancient and majestic civilisation.

All that scholars of previous centuries knew about Babylon, "mother of cities", and Assyria, the "lions'den", had come from the embellished accounts of Herodotus, the still more fantastic composition of the Babylonian priest Berossus, and stories from the Bible, distinguished by equally far-fetched flights of the imagination. Then archeologists started digging in the Holy Lands, as they are called, and to mankind's astonishment, brought to light the ruins of tall temples and big palaces, the most famous of them being the Tower of Babylon. Thousands of cuneiform tablets were carefully studied, and when they were finally deciphered a new science, Assyriology, which

is the study of the ancient cultures of Mesopotamia, came into being. Assyriology led to Sumerology after it was found that Babylon and Assyria had been preceded by the civilisation of the Sumerians, who spoke a language of their own and used a written language of drawings that later developed into the Mesopotamian cuneiform.

Early in the 20th century it became clear that a third great civilisation, the Hittite, had existed in the ancient East along with Egypt and Mesopotamia. During World War I the eminent Czech scholar Bedrich Hrozný finally deciphered the mysterious language of the Hittites. It proved to be an Indo-European language, related to Greek, Russian and other tongues. This gave rise to still another science, Hittology.

In the nineteen twenties and thirties British and Indian archeologists discovered a completely unknown culture to which they gave the name "proto-Indian". It seems that the bellicose nomad Aryan tribes, mentioned in the *Rig-Veda*, that invaded the Indian subcontinent did not enter a wild country. On the contrary, they found the proto-Indian civilisation, from which they borrowed the basic elements of the great culture that flourished in ancient India.

In the 19th century the American traveller John Stephens intrigued the world with his accounts of amazing sculptures and temples lost in the jungles of Central America. Since the last century archeologists have found dozens of ancient cities there. They have dug up hundreds of statues, temples and steles with calendric and hieroglyphic inscriptions. Spanish chroniclers recorded how Aztec cities in the valley of Mexico and cities of the Mayan tribes on the peninsula of Yucatan were plundered and wrecked. Now we know that

the Aztecs and the Yucatan Mayas were the heirs of earlier and still higher civilisations that existed in Central America. And not only in Central America. Numerous works of art, written records, temples and statues which the Indians created hundreds of years before Europeans reached the New World have been found in Colombia, Peru, Bolivia and Ecuador. All these cultures come within the province of the science of Americanology.

Another new science, Africanology, is resurrecting the ancient and medieval cultures of Africa. The magnificent frescoes of Tassili and the less well known cave paintings at Fezzan and in Tanganyika and South Africa; the amazing complex of buildings at Zimbabwe, where King Solomon's mines were once sought, and the equally magnificent Inyangeni mountain complex whose construction involved as much labour as the Egyptian pyramids; the bronze masterpieces of Benin; the mysterious ruins on the shores of East Africa and the no less mysterious drawings of South Africa; the great Axumite kingdom in Ethiopia and the still greater and more ancient Meriotic kingdom—all these are merely separate pages in the long history of the Black Continent.

Until the middle of this century Australia and Oceania remained *terrae incognitae* to archeologists; chance finds by geologists, gold prospectors and farmers do not count. Today these remote corners of the globe are beginning to attract the attention of archeologists. Excavations in Australia show that the continent was settled many thousands of years earlier than had been believed. Digs on the Fiji Islands and in Micronesia, on the Hawaiian and Marquesas islands, on Easter Island and in New Zealand are only the initial steps in another young science studying Oceania.

Ruins of vanished cities and traces of dead civilisations are very often found in places that are now either deserts or jungles. The Mayan culture, one of the highest pre-Columbian civilisations in the New World, was discovered by John Stephens after a long and arduous search in the nearly impassable jungles of Central America. The "dead city" or Hara Hoto, capital of the once powerful Tangut kingdom, was found by the Russian traveller Ivan Kozlov after exhausting treks across the barren sands of the Gobi Desert.

Today, aerial photography pinpoints sites of ancient buildings and towns. The ruins of ancient Khwarizm, almost completely buried in the sand, were photographed from the air before digging started. The photographs helped Soviet archeologists to make careful and thorough excavation plans that led to the discovery of the unique ancient civilisation of Khwarizm.

The sciences of criminology, nuclear physics, cybernetics, genetics and chemistry are helping archeology more and more. Egyptian scholars are now trying to make gigantic X-ray pictures of the great pyramids of Khefren and Cheops in the hope of finding secret bricked-up chambers and premises that might be hidden behind the thick slabs of stone.

A full account of the present-day methods used in archeology, a science which with the help of other disciplines is becoming an *exact* science, would take hundreds of pages. In this book I shall dwell on only one aspect of modern archeology, the connection between the discovery of "submarine outer space" and the Great Historical Discovery of our globe, in which archeologists, linguists, ethnographers and anthropologists are taking part. At the junction of these two great

discoveries a new science, underwater archeology, has come into being.

With the invention of the aqualung archeologists were able to start exploration and excavation of the sea bottom. The first steps in underwater archeology were made, however, long before the aqualung was invented. Like "land" archeology, underwater archeology originated in Greece, or rather, off the coast of Greece.

This was in the year 1802, when Greek divers salvaged cases filled with priceless friezes of the Parthenon from the *Mentor*, a ship which was wrecked near the island of Antikythera. Nearly a century later, at the end of 1900, sponge-divers noticed the hand of a statue sticking out of the silt not far from the *Mentor* shipwreck: They went down again and again, discovering a whole cemetery of works of ancient art. Next, the Greek government outfitted an expedition to work there at a depth of 60 metres between November 1900 and September 1901. This was the world's first underwater archeological expedition.

Archeologists conducted their next big underwater exploration near the Tunisian port of Mahdia in 1907. Here, by chance, they found the wreck of an ancient ship carrying a cargo of marble columns, bronze and marble statues, clay vessels and slabs of marble. Salvaging proceeded for five seasons until 1913. Magnificent sculptures and a large quantity of handicraft wares were raised from the bottom of the sea.

Underwater archeological exploration was also conducted in the period between the two world wars, in the twenties and thirties. But large-scale work did not begin until after the aqualung was invented in 1943. Skin divers have found dozens of ships in the Mediterranean and have salvaged

a vast number of ancient amphoras, statues, household articles and marble slabs and columns.

This branch of archeology does not limit itself to finding and studying wrecked ships. Archeologists have also excavated sunken settlements, and not only settlements. American archeologist Edward Herbert Thompson conducted one of the first underwater explorations in 1904 when he set out to find Mayan treasure lying at the bottom of a sacred well in the ancient city of Chichen-Itza. His work was continued in 1961 by a large and excellently-equipped expedition including archeologists from the National Institute of Anthropology and History in Mexico, skin divers from a Mexican water sports club, and diving experts from the United States.

Using an ordinary dredging shovel, Thompson salvaged thousands of the most diverse objects, from priceless gold discs depicting battles and ritual scenes to the bones of unfortunate sacrificial victims thrown into the sacred well. In 1961 a suction pipe 25 centimetres in diameter was used to suck up water from the well, and silt and small objects together with it. The first day's finds included potsherds and chunks of fragrant yellow resin which the ancient Mayas used in their rituals.

There was work for skin divers too. They explored depths which the dredge pump could not reach. Their efforts were generously rewarded with a clay bowl and the figure of an idol made of pure rubber. In four months of intensive, painstaking work Mexican archeologists found a tremendous number of all kinds of articles made not only by the Mayas but also by Indians who inhabited Central Mexico, Honduras, Costa Rica and Panama and the other regions of Central America.

This indicates that the Mayas traded extensively with other Indian tribes and peoples. Finds salvaged from the bottom of the sacred well have helped to throw light on the history of the city of Chichen-Itza. Sacrifices to ancient gods continued to be made there even after the city was abandoned. The richest archeological yields date back to the time when the city was ruled by the belligerent Toltec-Aztec conquerors from Central Mexico, between the 10th and 13th centuries A.D.

Mexican underwater archeologists believe that neither Thompson nor their own multipurpose expedition have exhausted the treasures of the sacred well. But scholars are interested in more than the treasures lying at the bottom of the well. They feel that it is far more important to establish the sequence of the strata. The objects found in the well, brought there from all over Central America, will help archeologists to determine the age of the Central American cultures. Such stratigraphy will have to be left for future study, after at least part of the well has been drained and more precise and reliable tools than a dredging pump are used.

Besides comparing the strata in a single well, archeologists may in future be able to conduct strata comparison on a broader scale. The results of the underwater excavations of sacred wells in Central America have already made a valuable contribution to the young science of Americanology.

In Guatemala, statues of Mayan gods and colourfully decorated pottery have been found at the bottom of Lake Amatitlan.

Interesting discoveries await underwater archeologists in Lake Guatavita, Colombia, which lies

in the crater of an extinct volcano. Legend has it that subjects of the fabulous El Dorado, the "king of gold", flung precious gifts into this lake. The future will show whether there is any truth in the legend. Meanwhile, skin divers are reconnoitering lakes in the Old World, including the Soviet Union, as well as the New World.

Not long ago the science department of the Moscow newspaper *Literaturnaya Gazeta* organised an expedition to search for Kitezh, a city supposed to have sunk to the bottom of Lake Svetoyar. Nothing has been found there so far. But at other lakes in the Soviet Union archeologists have discovered many interesting things, including the ruins of a settlement of the second century A.D. at the bottom of Lake Paleostomi, near Poti, in the Georgian Republic.

Ruins of ancient settlements have been discovered in Lake Issyk Kul high in the mountains of the Kirghiz Republic. Chichu Gen, the capital of the Usuni, contemporaries and rivals of the warlike Huns, and cities mentioned by Marco Polo may lie at the bottom of this lake. The waters of Lake Sevan, in the Armenian Republic, concealed the ruins of one of the oldest cities on the territory of the Soviet Union. It was built by Urartu rulers in the third millennium B.C. Underwater archeological research at the bottom of Lake Chudskoye (Lake Peipus) has helped historians to reconstruct important details of the famous Battle on the Ice there in the Middle Ages.

Many discoveries have been made at the bottom of other lakes in Europe and Asia. Hungarian archeologists have found the walls of a building dating back to the Roman Empire and a smithy of the fourth century A.D. on the floor of Lake Balaton. On the bed of Lake Pulaki Polish archeol-

ogists have found a military settlement of the Prussian tribes, ancient inhabitants of the Masurian forest, that goes back 2,500 years. Some 50 Stone Age sites and 12 Bronze Age sites have been found in Boden See, Switzerland. All of the sites were built on piles.

In the German Democratic Republic villages on piles have been located by skin divers in lakes in the environs of Berlin and in the state of Mecklenburg. West German archeologists have discovered, in the bed of the Rhine, the remains of an ancient fortress, of a military camp of a Roman legion, and of a town that grew up beside the camp in the reign of Emperor Trajan. Interesting finds have been made at the bottom of Rupkund, a small mountain lake in the Himalayas.

An even larger number of underwater finds will undoubtedly be made at the bottom of seas and oceans. Investigation into dwellings of primitive man is in progress on the floors of the Baltic and North seas. Searches are being made for sunken cities at the bottom of the Mediterranean, Black, Caribbean, Aegean, Adriatic and other seas. And this is only the beginning.

Geology and oceanography tell us that the earth's crust rises and falls, that seas and oceans alternately advance on the land and retreat. These movements went on millions of years ago and also during the time when *Homo sapiens* was developing, when he started his triumphant march across the globe, and when the early civilisations arose. These movements continue to take place literally before our eyes.

At the bottom of the seas and oceans archeologists are seeking, and finding, monuments of antiquity that have been safely protected against destruction by a thick layer of water. Each year

they are discovering more and more traces of sunken cities and villages, evidence that primitive man once lived in places now covered by water.

The future obviously promises many new geological, oceanographic, archeological, historical and ethnographic discoveries.

The first part of this book deals with the Pacific Ocean, the world's greatest ocean in size, importance, depth and volume. Can the underwater archeologist expect to come upon traces of *Homo sapiens* at the bottom of this ocean, or its adjoining seas, either in the shape of ruins of sunken cities or as crude stone tools fashioned by Paleolithic man?

Part One

THE PACIFIC OCEAN

Discovery

At the end of November 1520 the three surviving ships of Magellan's fleet emerged from a narrow, tortuous strait into unknown waters. The Spice Islands (Moluccas), the goal of the expedition, lay somewhere to the south-west. The immeasurable expanse across which Magellan sailed was so calm that he named it "Pacific".

On January 24, 1521, after two months in these waters, the three ships finally caught their first glimpse of land, a tiny desert island. Ten days later they came to another barren island. Only on March 6, after three months and twenty days, did the seafarers, tormented by hunger and thirst, reach inhabited land, the island of Guam. That was how Europeans discovered the strange, unique, astonishing world of Oceania.

In the following decades and centuries Spanish, Dutch, English, French and Russian frigates plied the waters of the Pacific Ocean and the explorers entered more and more discovered lands on the map. In the wake of the geographical discoveries a study of the vast ocean and its islands was begun by oceanographers, botanists, zoologists, meteorologists, geologists, linguists, folklorists and anthropologists. Although these investigations have a history of more than 400 years, they have developed on a large scale only in the present century.

From the very beginning the question that agitated the minds of the navigators and early explorers of the islands and archipelagoes of Oceania was how man had first reached them, for some are separated by thousands of kilometres of ocean.

In the 16th century the Portuguese navigator Pedro de Quiros advanced the theory that the islands were the remains of a large, now submerged, continent, and their inhabitants were de-

scendants of its population. Many other well-known navigators supported this view. Its most ardent champions were two students of Oceania, the distinguished French naval commander and explorer Dumont d'Urville and his fellow-countryman Moerenhout, collector of folklore.

To support the idea that America and Asia were once joined by a large land mass Dumont d'Urville thought that Oceania's volcanic islands, such as the Hawaiian Islands, were the peaks of mountain chains which stretched across the now sunken continent. The continent, he said, had been inhabited by a large and civilised population whose descendants, now greatly degraded, remained on the Pacific islands and islets. Moerenhout, in his turn, used folklore as evidence that a continent had existed until a colossal cataclysm led to its submersion and the death of a great number of people.

Dumont d'Urville and Moerenhout published their hypotheses in the first half of the 19th century, when oceanographers, anthropologists, geologists, folklorists and ethnographers had only just begun to study Oceania. As new data came to light, new theories concerning a hypothetical Pacific continent appeared.

In a monograph published in 1865 the English naturalist Alfred Wallace, associate of the great Darwin, cited evidence to prove that the contemporary aborigines of Australia, the Papuans of New Guinea, the dark-skinned Melanesians and the light-skinned Polynesians were all descendants of a single "Oceanic race" that had inhabited a vast Pacific continent, now sunken. Thomas Huxley, another outstanding evolutionist of the 19th century, shared Wallace's view.

The hypotheses of biologists and anthropologists were supported by some geological theories, except that geologists put the disappearance of the Pacific continent at a far earlier date, before man had evolved. The French geologist, Haug, thought that a vast land mass, situated in the central part of the Pacific, began to submerge in the Mesozoic era, that is, between 100 and 200 million years ago. The German geologist H. Hallier agreed with him. In 1911 the Russian geologist Lukashevich compiled a series of maps of the hypothetical Pacific continent showing all the changes it underwent, up to and including its final submergence.

In 1923 and 1924 two books about the hypothetical continent appeared, written by men living in different countries and working in quite different fields of science; they probably did not even suspect each other's existence. They were Mikhail Menzbir, Russian pioneer in zoogeography, and J. Macmillan Brown, English ethnographer, who spent a lifetime studying the numerous tribes and peoples of the Pacific. The titles of their books were similar: Brown's *The Riddle of the Pacific* and Menzbir's *Secrets of the Great Ocean*.

Menzbir presented a number of arguments relating to geology, ethnography and oceanography that testified, although indirectly, to the existence of a land mass in the Pacific Ocean at one time. His most persuasive and astounding arguments came from zoogeography, a science dealing with the geographical distribution of animals and their migration routes.

Take the case of the fish called *Galaxias*, which was first discovered in the rivers of New Zealand in 1764. This genus is confined to fresh water

on the continents and islands of the Southern Hemisphere, in 30° to 60° S. The Galaxias is found only in fresh water; it cannot live in salt water. How, then, did it reach New Zealand, which lies many hundreds of kilometres away from the continents? How did this fish get into the waters of several other Pacific islands? Since the Galaxias could not have migrated through the salty waters of the ocean, the only way was along the fresh-water rivers that once flowed in the now sunken Pacific continent.

Or take the iguana, a large lizard that once inhabited continents and is now found on the Galapagos and Fiji Islands. Iguanas are poor swimmers, so it is unlikely they crossed the ocean. Doesn't this signify that the islands were once connected with a land area? There are many other inhabitants of the Pacific islands, from beetles, mollusks, amphibia and ants to butterflies and crayfish, which could not have travelled hundreds, in some cases thousands, of kilometres through the ocean to reach their present habitat. The snakes that live on many Pacific islands can hardly swim at all.

On the islands of Oceania we find specimens of specifically North American, East American, South American, Australian, Indonesian, and even Antarctic flora growing side by side.

Botanical and zoological data offered convincing evidence of the existence of a continent or of large land bridges in the Pacific. In Menzies's opinion, the humanities, the branch of learning concerned with human thought and relations, showed that the land mass sank in human times. Not in the time of primitive man but much later, after man had attained a certain degree of civilisation. Professor Brown devoted almost the

whole of his voluminous monograph to proving this. He concentrated on the enigmatic culture of tiny Easter Island, a culture that vanished before scholars had time to describe and study it.

The Mystery of Easter Island

The first Europeans to visit Easter Island, in the early 18th century, were amazed to find enormous carved stone images of long-eared human beings surmounted by hats or crowns.

They also found wooden tablets covered with writing in a unique and undecipherable script.

The statues stood on stone platforms (the local inhabitants called them *ahus*), some of them so large—all of 60 metres long and three metres high—that no less labour must have gone into their construction than into the statues themselves. An *ahu* usually supported several images. But literally before the eyes of the seafarers who visited Easter Island between late 18th and early 19th centuries the statues were pulled down from their platforms one by one. By about the middle of the 19th century not a single statue remained on the platforms. True, some images still remained upright, not on the coast but in the quarry, in the crater of a volcano, from where they began their journey to the shore.

Altogether, some 600 stone images have been found in various parts of the island. The size of some of them staggers the imagination when we remember that they were fashioned with primitive stone implements. The largest statue, not only on Easter Island but in the whole of Oceania, is 20 metres 90 centimetres high. The

head of this giant is 11 metres high, with a nose measuring four metres!

There is something else that is still more astonishing. Not only did the makers of the images sculpture them out of hard, unyielding stone, move them to the coast, and erect them on platforms, the building of which also called for titanic effort. They crowned the images with tall cylindrical hats of red tuff, which the islanders call *pukaos*. The *pukaos* were carved in a different quarry, located in the crater of a small volcano in the middle of the island. This is the only place having deposits of red tuff. The hats evidently had to be made of red stone.

They fit the statues well. One statue had a hat just under two and three-quarter metres in diameter and two metres high. In the quarry itself lies a *pukao* that is more than three metres in diameter; it is two and a half metres high and weighs 30 tons!

It is hard to imagine how the islanders managed, without hoisting devices, draught animals or implements of iron or bronze, to transport and erect the statues which discoverers of Easter Island were fortunate enough to see still upright. Yet the stone giants standing on the platforms, crowned by hats weighing many tons, are not the only notable sight—and mystery—although they are the main one, on this islet in the Pacific Ocean.

The urge to record speech and keep accounts arises only in civilised societies; primitive tribes get along with pictographs, a language of drawings. Easter Island had a unique script, unlike any other in the world. All attempts to find convincing traces of similarity between any other writing and the writing of Easter Island,

known as *kohau rongo-rongo* ("the talking wood") have failed. Yet scholars have compared the tiny *kohau rongo-rongo* characters, engraved on wooden tablets with a shark's tooth, with scripts ranging from Egyptian hieroglyphs and the writing found in caves on Ceylon to scripts discovered in Mesopotamia, Central America, Southern China, South America, India and Mexico.

Many of the characters in the *kohau rongo-rongo* script closely resemble the stylised figures that cover Easter Island rocks and cave walls. The cave paintings depict insects, fish, mollusks, birds and, most important, the mysterious figure of a bird-headed man with outstretched paws with claws on them.

According to legend, the Easter Islanders, before they were converted to Christianity, held an annual ceremony in which they chose their *tangata-manu*, or bird-man. The ceremony combined the elements of a religious cult with those of a competition. The winner of the competition became the ruler of the island—for one year exactly—and was honoured as a deity. The bird-man is represented in magnificent sculptures made of the hard wood, which the islanders carved so skilfully, along with representations of fantastic beings, as well as fish, birds and humans.

Stone giants weighing many tons; huge stone platforms; unique writing that is unlike the hieroglyphs of other ancient scripts; rocks covered with carvings; a surprising competitive religious ceremonial not encountered anywhere else; magnificent wooden sculptures—surely all this is too much for one tiny island lost in the vastness of the Pacific! Could other lands have lain

close by to Easter Island long ago? Or could Easter Island itself be only a small remnant of what once was a large and well-populated land mass?

The famous mariner and explorer James Cook believed that a cataclysm must have struck Easter Island. Dumont d'Urville and Moerenhout were certain that the population and culture of Easter Island, like those of many other Pacific islands, are only the remains of the civilisation of a Pacific continent. Many scholars agreed with this hypothesis. Macmillan Brown gathered together all the evidence pointing to the existence of a Pacific continent that was tragically destroyed within human memory. Among other things, he cites enigmatic facts from the history of the discovery of Easter Island by European seafarers.

First, there is the record of what Juan Fernández saw. In 1572 this Spanish navigator discovered what we now know as the Juan Fernández Islands, one of them Robinson Crusoe's island off the coast of Chile. When, six years later, he again sailed the waters of the southeastern Pacific a storm drove his ship far to the south, towards an unknown land. Although Fernández did not dare to drop anchor there he later declared that he saw the mouths of very large rivers and "people so white and so well-clad and in everything so different from those of Chile and Peru". He took this to be the great Southern Continent, then believed to exist, which navigators before him had unsuccessfully tried to find.

The delighted captain hurried back to Chile to make thorough preparations for his next expedition. He kept both his unexpected discovery of a continent (or large island) and his

preparations for a big expedition there a secret. But death prevented him from carrying out his plans. The project died together with him. Only many years later did historians learn of Juan Fernàndez's surprising discovery.

In 1687 the ship of the English buccaneer Captain Davis sailed directly southward from the Galapagos Islands on the equator and, after covering about 2,000 miles, sighted a low, sandy shore at 27°20'S, 500 miles off the Chilean coast. Several dozen miles to the west was a long tract of high land.

On April 6, 1722, the Dutch admiral Roggeveen discovered a small rocky island in that same area and named it Easter Island. There was no land anywhere near the island except for three tiny islets at the southwestern end and another islet near its eastern coast.

To recapitulate Professor Brown's chain of evidence: at the end of the 16th century Juan Fernàndez sighted a large land, fruitful and well-populated; in 1687 Captain Davis saw "a low, sandy coast" and "a long tract of high land" west of it; but in 1722 Admiral Roggeveen found only a single patch of land, Easter Island (the islets do not, of course, count). Does this not imply that the disaster which struck Easter Island or, rather, the Pacific continent, occurred within that period? What Fernàndez said may sound fantastic, but Captain Davis—and his entire crew, for that matter—really did see "a long tract of high land".

Traces of a cataclysm can be seen on Easter Island itself. Huge unfinished statues still lie in the quarry inside the crater of the volcano called Rano Raraku (*rano* means volcano and *raraku*, or *raku-raku*, means "to scrape"). Beside

them lie the primitive stone chisels and scrapers used to carve the images. It is a small island, yet in Professor Brown's opinion it required many thousands of workers to make such a large number of stone colossi, at least as many workers as built the Egyptian pyramids. These thousands of people had to be fed while they worked. Where could the builders and the people who fed them have lived except on a large area of land? Also, such grandiose construction could have been undertaken only by a country with a strong centralised government.

According to a legend about the peopling of Easter Island, the first settlers, sent by a chief named Hotu Matua, found some inhabitants there when they arrived. One of them told the new arrivals that Easter Island had once been a big country and was destroyed by a giant named Uoke. Since then the island has been called Te Pito o te Henua, the Navel of the Universe.

No one knows what the writing engraved on the *kohau rongo-rongo* wooden tablets says. In the 19th century, however, ethnographers recorded several legends which were said by islanders to be translations of the tablets.

According to one legend, when the island was first created it had many roads criss-crossing it. They were built by Heke (which means "octopus"), who sat in a place of honour in the middle of the island. From there the roads radiated in all directions like a grey-and-black spider's web. No one could determine where the roads began and where they ended.

Today there are traces of paved ways on Easter Island that run down to the edge of the sea and break off, roads that lead nowhere. Or do they

lead farther, to a land mass that vanished under the water?

Professor Brown believed Easter Island to be a vast mausoleum where giant likenesses of the kings and chiefs of a now submerged country were erected. The statues give us an idea of the appearance of the vanished inhabitants of the hypothetical Pacific continent. They had imperiously jutting chins, compressed, arrogant mouths, deep-sunken eyes and elongated ear lobes.

A missionary, Eugenio Eyraud, said that the islanders used the tablets by custom, "without enquiring into the sense of them". Doesn't this indicate that the *kohau rongo-rongo* writing, like the stone giants, is a remnant of the culture of a submerged continent?

The mysterious rock drawings represent, as we have said, bird-men and the unusual royal election rites that took place annually on Easter Island until the ancient culture perished and the inhabitants were converted to Christianity. Could this bird-cult, not found on other Oceanic islands or anywhere else in the world, be a survival of the beliefs of the people of the hypothetical Pacific continent? Is the old culture of Easter Island the last trace of a vanished civilization?

Remains of the Pacific Continent

Perhaps it is, but it is not the only one. Professor Brown searched for the submerged culture of the hypothetical continent on other islands in Oceania, and he found stone statues similar in style to the Easter Island giants,

although smaller, on the Hawaiian Islands, on tiny Pitcairn Island, and on the Marquesa Islands.

Lost in the vast waste of waters of the Pacific near the equator, there are several small islands on which the first European visitors, at the end of the 18th century, found nothing but scanty vegetation. No one appeared to have ever lived on those miserable patches of land.

Yet coconut palms grew there, and they could have reached the islands only with the help of man. Since then other, more obvious, traces of man have been found. Christmas Island has rectangular platforms made of slabs of coral. Malden, another island in this equatorial group, also has platforms, as well as the ruins of a temple. The shape of the temple, judging from a sketch, resembles that of the ancient pyramids of South America.

With the ocean stretching on all sides for hundreds of miles, who could have built the platforms and the temple? How could the unknown builders have erected these structures if the islands do not even have a fresh water supply? Could the ruins be the remains of a mysterious culture that sank into the Pacific along with the fertile lands that fed the thousands of building workers? Was Malden Island, like Easter Island, only a place connected with the ceremonials and festivals of the people of a great country that now lies beneath the waves of the Pacific?

The centre of this vanished empire lay, according to Professor Brown, far to the west, near small Ponape Island, where cyclopean ruins were found in the 19th century. The basalt walls of some of these great structures were six metres

thick. Immense blocks of stone weighing up to 25 tons had been raised to a height of almost 20 metres! Such colossal work could have been performed only by the organised labour of many thousands of workers. A country capable of erecting such gigantic structures must have hundreds of thousands of inhabitants. Yet within a radius of 1,500 miles there live no more than 50,000 people, on islands and islets separated from one another by hundreds of miles. What is more, you would not find 2,000 among them capable of doing the hard work of a builder.

There are likewise the remains of monumental structures—two parallel rows of stone pillars four metres high—on Tinian Island, which is also in the western part of Oceania. Were these pillars ornamentation, or did they support the floors of houses? And who built those enormous houses? The modern inhabitants of the Tinian Island live in small reed or wooden huts.

Professor Brown cited other archeological, ethnographic and anthropological evidence pointing indirectly to the existence in the Pacific of large land masses or separate islands and archipelagoes that are now submerged. He was fully aware, of course, of the fact that all this was only indirect evidence and would remain such until bolstered by the findings of natural sciences like geology, zoogeography and oceanography. He did refer to some evidence furnished by those sciences, among them the fact that both the western and eastern parts of the Pacific, and the coasts of Asia and America which they wash, are subject to severe earthquakes. In other words, the earth's crust there is unstable.

At the time of Brown and Menzies little was known about the structure of the Pacific bed.

In the mid-twenties of our century scientists had only indirect data to go by. On the basis of their sciences ethnographer Macmillan Brown and zoogeographer Mikhail Menzbir came to the same general conclusion—that a land mass had existed in the Pacific and it had vanished within man's memory.

Marine geology was now the only science that could prove the hypotheses and indirect evidence. Oceanographic research conducted in the region of Easter Island and north-east of the island early in the thirties led to the discovery of the large underwater Albatross Plateau. From the rocks brought up from the bottom the American geologist L. J. Chubb, who was in charge of the expedition, concluded that land connecting South America with Australia and perhaps even Asia had once existed there. But he also drew a conclusion that was of no comfort to the supporters of an "inhabited Pacific continent". Submergence of the land mass here, he declared, took place very long ago; in the past few thousand years Easter Island has not subsided by a single yard. Despite Brown's contention, at the time when the monuments were erected the shoreline was as stable as it is today.

Although scientists now know a great deal more about the marine geology of the Pacific than in the 19th century or at the beginning of this century, the debate about hypothetical Pacific continent goes on. Many oceanographers and geologists believe that the vast depression in the Pacific has existed there ever since the formation of the earth's crust. But some support the Pacific continent theory. Among the latter are the Soviet geographer Panov, the Bulgarian geologist Mikhailovich, the Soviet zoogeographer

Lindberg and a number of other Soviet and foreign scientists. Contemporary researchers on Easter Island have found rhyolite, rock that is of continental origin. What is even more important is the fact that they have found continental crust on Easter Island, although not a deep layer. "This supports the assumption that a continent once existed in the eastern part of the Pacific", says Panov.

Millions of years ago, say advocates of the Pacific continent theory, this land mass covered a vast area, forming an unbroken bridge between Australia and America. Then sections of it began to subside and break up into island continents: Australia, a Melanese continent, including the islands of Melanesia, a West Pacific continent, combining what are now the thousands of small islands and islets of Micronesia, the Hawaiian continent, stretching from Japan to California and of which only the Hawaiian Islands remain today, and, finally, the East Pacific continent, of which Easter Island is one of the remains.

When Did This Happen?

The land bridge between America and Australia started to break up a very long time ago. The sinking of the land continued for millions of years. Even today the coast of South-East Asia is subsiding into the Pacific centimetre by centimetre. The East Pacific continent split off from the rest of the land mass long before man appeared on earth. But when did it start to sink into the ocean, leaving Easter Island all by itself?

Professor Brown believed that the subsidence of the last remnants of land took place quite recently, between the voyages of Davis and Roggeveen. From the viewpoint of geologists this is absurd. Academician Vladimir Obruchev, the eminent Soviet geologist, suggested a more plausible point of time. He placed the sinking of the land in the region of Easter Island at the time of the glacial epoch, when the melting of the ice led to a rise in the level of the oceans, including the Pacific, and the low-lying sections of land were submerged.

It was quite possible, said Obruchev, that extensive lowlands with thickly populated towns and villages once existed around the mountainous part of Easter Island. These lowlands were gradually submerged when the last Ice Age ended. The population, probably urged on by priests or sorcerers, hurriedly began carving statues with threatening faces out of the local volcanic tuff and setting them up along the coast in the hope they would hold the sea back and thereby save the coastal towns and villages. The melting of the glaciers had not yet ended, however, and the sea level continued to rise. In the end, the island lowlands were submerged. The population either perished or gradually moved to other islands in Polynesia. Only many years later did other inhabitants, who knew nothing about the preceding culture, appear on Easter Island.

In Academician Obruchev's opinion, Easter Island had attained a high level of culture about 10,000 years ago.

It well may be, as Academician Obruchev believed, that the last remnants of the hypothetical Pacific continent were destroyed in human

times, when the level of the ocean rose as the glaciers melted. But the end of the last Ice Age evidently has nothing to do with the riddles of Easter Island. The melting of the glaciers took place between 10,000 and 12,000 years ago. Archeological excavations show, however, that the island was settled at the beginning of our era. Construction of the gigantic statues is placed at no earlier than 1100 A.D. That would make a gap of some 10,000 years between the melting of the glaciers and the carving of the images.

What is more, it seems unlikely that the statues were erected to prevent an invasion by the waters. Supporters of that theory vividly describe how "the ocean continued to rise and the stone gods fixed their wrathful, threatening gaze on it in vain". But the stone giants stood with their backs to the ocean, as evidenced by sketches made by the first explorers to see the statues on their platforms, and also by the findings of archeologists.

Or consider the enormous stone platforms, the *ahus*. If Easter Island were larger, why did they build the platforms along the entire length of the coastline? It is highly improbable that the ocean could have risen so evenly that it reached the platforms and then stopped. It is much more likely that the platforms were erected along the shore, and that the shore has remained unchanged since the time the platforms were built.

Even if one were to assume that the platforms and statues were erected as protection against the threat of the rising water, and were placed on the shore to prevent that, then they should have vanished under the waves long, long ago.

But could the Easter Island monuments be merely the remains of a once great culture, with

the ocean bottom preserving far more traces of this culture than Easter Island itself? Could the ocean floor be strewn with platforms and statues? After all, the paved roads stop abruptly at the edge of the ocean.

Professor Zubov's Theory

On the other hand, why necessarily search for submerged land along the shores of Easter Island? Even if the picture of a dramatic break-up of a continent and sinking of the island shores, together with their huge statues and platforms, is a figment of the imagination, this does not mean there may not be other lands around Easter Island that are now at the bottom of the ocean.

Professor Brown believed that Easter Island was a vast mausoleum, visited by the people of neighbouring islands that have vanished. In an article written in 1949 Professor Nikolai Zubov, an eminent Soviet oceanographer, put forward a hypothesis that Easter Island was once a kind of Mecca for the inhabitants of Oceania, that people from many islands, both those that exist now and those that have vanished, voyaged there to perform religious rites.

This, said Professor Zubov, is confirmed by the fact that all the statues were made in the same place, of the same material, while all the hats of the statues were also made out of the same kind of stone, but in a different place. Also by the fact that all the statues lining the roads leading to the quarry were set up with their backs to the quarry, in such a way that travellers or processions of people going to the quarry to

work saw the faces of the images. Although, said Professor Zubov, the purpose of the statues on the burial platforms and along the roads leading to the quarries could somehow be explained, there was no explanation for the statues dug into the ground on the outer slope of the crater, to say nothing of those on the inner slope. It would have been impossible to drag the statues out of the crater. Nor was it intended that they should be dragged out. It cannot be accidental, Professor Zubov said, that all the statues stand with their faces turned towards the centre of the crater.

Professor Zubov considered the fact that all the statues were made according to a single pattern to be even more weighty evidence in support of his theory. There was no question here of any sort of creativity, of any quest for something new. You did not have to be an artist to carve a statue. All you needed was diligence. The relative sizes of the individual features of the images had long been established. Regardless of their size, the statues intended for the burial terrace and set up on the horizontal platforms would be stable. So would those intended to be buried in the earth.

But if we view Easter Island as the Mecca of Oceania, Professor Zubov said in conclusion, a question arises which is more involved than the question of the peopling of the island. Pilgrimages mean regular travel, yet this would hardly be possible if thousands of miles separated Easter Island from the other islands of Oceania. Besides, provisions and other supplies would have to be transported.

It is quite possible that a large number of islands and archipelagoes, now submerged, facil-

itated travel between Easter Island and other Oceanian islands.

A quarter of a century after the books of Brown and Menzies appeared, Professor Zubov again put forward the theory of sunken land in the region of Easter Island. Now an oceanographer had come to the support of the ethnographer and zoogeographer. A true scholar, Professor Zubov admitted that only a thorough investigation of the Pacific bed, an investigation which to this day is incomplete, would bear out or refute the hypothesis.

Pacific Floor Theories

Continuing our attempt to solve the riddles of Easter Island, we must now take a look at the floor of the Pacific, where scientists have discovered a vast submarine land, with mountains and abysses. And to explain the origin of this submarine land we shall have to look into another abyss, not oceanic but geological—the abyss of time that has passed since our planet was formed.

Geophysics has shown that there are two types of crust, the oceanic type and the continental type. Was there always this division? Or did the whole earth originally have an oceanic type? Or did it have a continental type? Which came first?

The answers to these questions will resolve the problem of the origin of the Pacific basin, a basin that covers almost half the globe. Below, we reproduce the table of hypotheses of the origin of oceanic basins drawn up by the prominent American oceanographer Professor H. W. Menard,

The table clearly sets forth all the possible variants of a solution to the problem, so that we have only to find the "correct" section of the table.

Hypotheses of the Origin of Ocean Basins

Original crust	Modification		Differentia- tion
	Meteorite		
	Impact	Ejection	
	1	3	5
OCEANIC	Meteorites are conti- nents		Mantle yields conti- nents and water
	2	4	6
CONTI- NENTAL	Scars are ocean basins	Scar is Pacific Basin	Continents "basaltified" to oceanic basins

According to the hypothesis in the section numbered 1, the oceanic crust came first, after which continents grew as meteorite matter accumulated on the surface of the earth. The hypothesis in section 2, on the contrary, assumes that the continental crust came first, after which basins were blasted in the crust by impact of meteorites. Neither hypothesis is popular today.

The section numbered 3 is empty. No one will assume that the gigantic Pacific basin could have been formed because land became separated from the surface of the earth and was ejected into outer space. But hypothesis 4 is intriguing and has won many supporters. They believe that the Pacific basin is the space left by the Moon after it became detached from the Earth!

The hypothesis, however, is rejected by most scientists today because it explains too little, and too many facts contradict it. Efforts are still being made to resurrect it, although not very successfully. Analyses of moon rock show that our satellite is composed of non-terrestrial matter.

Today the overwhelming majority of oceanographers and geologists share the last two hypotheses. According to one (section 5 of the table), the oceanic crust came first, and the continents and water were formed from the mantle. (Professor Menard supports this assumption.) Soviet geologist A. P. Vinogradov is the scientist who has most thoroughly substantiated it.

The opposite hypothesis (see section 6) assumes that the oceanic basins, including the largest, the Pacific, were formed as a result of gradual fragmentation of the continents. Blocks of continental crust were "dissolved" in the basalt rising out of the bowels of the earth, and this crust turned into oceanic crust. However, as F. Shephard, one of the founders of marine geology, has correctly noted, our present knowledge of the structure of the earth's crust is only sufficient to reject some of the older and more obviously erroneous assumptions but insufficient to construct promising new hypotheses.

Geophysicists have proposed an impressive project of deep sea drilling through the thick layer of sediment that has accumulated on the floor for millions of years, and then farther down through the oceanic crust to the mantle itself. Evidently, only this can tell us which is primary, the oceanic crust or the continental crust.

But even before scientists drill through the crust we may confidently state that the Pacific Ocean

was once different from what it is today although, says Professor Menard, "almost all of the geology of the Pacific Basin may well have originated during the last 200 million years".

The Darwin Rise

Two hundred million years is, of course, a very approximate figure. It was arrived at by estimating the present rate of sedimentation of the Pacific floor and then comparing it with the present thickness of the layer of sediment on the Pacific floor. But we do not yet know whether the rate of marine sedimentation was constant at all periods in the history of our planet. Over the ages the sedimentary layer may have become packed down, consolidated, and we have no reliable data with which to calculate the ratio between consolidation and one or another period of geological time.

Hence, other methods are used to determine the age of the Pacific, such as, for example, the time it would take to acquire its present degree of salinity. Estimates have shown this to be between 100 million and 300 million years, that is, the average agrees with Menard's figure. However, we do not know if the oceans grew saline at a constant rate.

Shephard notes the following interesting circumstance: no matter how many different fossils the dredges bring up from the ocean floor and from seamounts, none are ever older than the Cretaceous period. He believes this shows that the oceans may not be very old. The Cretaceous period began 140 million years ago and lasted 70 million years. This would make the Pacific a good

50 million years younger than Menard thinks, that is, about 150 million years old.

Some scientists put the origin of the Pacific at an even later period. Academician Shcherbakov, for instance, believes the oldest layers of the ocean floor were formed about 100 million years ago. Finally, the Soviet geologist G. Afanasyev offers a new estimate of the sedimentation rate and puts the origin of the Pacific, and of the World Ocean too, in the Tertiary period, which would make the Pacific no more than 70 million years old. In fact, Afanasyev maintains that the Pacific is no more than 50 million years old.

Other scientists, using the same data on the sedimentary cover, believe that sediment was deposited much more slowly in the past and therefore place the origin of the Pacific at a much more remote period. Professor Leontyev, a Soviet oceanographer, thinks the Pacific is at least 1,000 million (!) years old. He and other scientists in the Soviet Union and abroad consider the oceans to be the same age as the planet, that is, thousands of millions of years old.

Despite their differences as to the dating, most scientists agree that the Pacific Ocean as we know it today developed as a result of long and intensive processes in the earth's crust, that it has its own geological history, although its prehistory is shrouded in the mists of time.

In setting forth this brief history we shall follow, in the main, Menard's excellent monograph *Marine Geology of the Pacific*. Here he brings together and summarises the vast amount of factual material that oceanographers and geophysicists have accumulated over recent years. Moreover, he examines all geological,

geophysical and biological processes and facts in their interconnection.

Two hundred million years ago, says Menard, the Pacific basin cannot have been much different from the basin as it is now: it was surrounded by an almost continuous ring of island arcs and submarine ridges. The water depth averaged about the same as now but the distribution of depths was different from the present. Sometime during the Mesozoic era there began, in the eastern and middle Pacific, a great process that led to the rise of a vast underwater land, the highest parts forming islands and archipelagoes, some of which still exist while others have disappeared. Menard calls this the Darwin Rise in honour of the great English naturalist, who first advanced the hypothesis that islands and banks, now submerged, once existed in that part of the Pacific basin.

This mid-Pacific underwater continent was 10,000 kilometres long and 4,000 kilometres wide, stretching from the Tuamotu Archipelago to the Marshall Islands. The paroxysm of volcanism that produced the Darwin Rise also led to the birth of volcanic islands and islets. Colossal crustal blocks were moved away; on the northwest flank of the Rise, island arcs developed and deep troughs were formed. By the Middle Cretaceous time, about 100 million years ago, large volcanoes had built up from the central part of the Pacific. When closely-spaced volcanoes had grown large enough to overlap along the flanks of the Darwin Rise they built great volcanic ridges such as the Mid-Pacific Mountains and the Tuamotu Ridge. Although other, more widely spaced volcanoes did not overlap, they did break through the water and form separate

islands. Among them, in Menard's opinion, are the Marshall Islands with their numerous volcanic peaks.

Today, the central part of the Pacific is an area of enormous waves and considerable depths. Millions of years ago there were groups of islands and extensive shallow banks here. The peaks of underwater ridges, formed when volcanoes merged into a single chain, crowned many of them. This was when the imperceptible but truly titanic work of the corals began. The remains of these tiny marine organisms, which flourish only at moderate depths, built up today's coral islands and reefs, atolls, submarine plateaus and banks.

If coral islands are built by shallow-water organisms, how is it that they are found at depths of several miles? Scientists pondered this question for almost 150 years. The great Darwin advanced the theory that a lagoon island is a monument erected by myriads of tiny architects to mark the place where land was buried in the ocean depths.

Darwin's hypothesis had its ardent champions and no less fervent detractors. It was debated for more than 100 years, until scientists of our day proved that Darwin was fundamentally right.

Coral reefs are found in the Atlantic, Pacific and Indian oceans. However, the small reefs of the West Indian and Bermuda islands in the Atlantic, and even the numerous coral islands and islets in the Indian Ocean (the Maldivé Islands and the Cocos or Keeling islands) are insignificant compared with the innumerable coral reefs scattered through the tropical part of the Pacific in a gigantic band running north-

west to south-east, almost 10,000 kilometres long and some 2,500 kilometres wide!

The large coral islands and archipelagoes—the Marshall Islands, the Caroline Islands, the Tuamotu Archipelago, the Gilbert Islands and the Ellice Islands—were inhabited long before the beginning of our era. Europeans did not find people on other coral islands in the mid-Pacific, but they came upon many signs that those islands had once been inhabited. Finally, there are hundreds upon hundreds of coral reefs that were never places of human habitation.

The Great Barrier Reef of northeastern Australia, discovered at the end of the 18th century by the famous Captain James Cook, stretches for almost 2,000 kilometres, the northern part about 100 kilometres from the coast, the middle section coming to within about 15 kilometres, and the southern part being more than 150 kilometres from the coast. Between it and the coast there are a large number of smaller coral reefs.

The assumption that the Great Barrier Reef and the other, smaller reefs along the coasts of continents and islands are “tombstones” on top of submerged land does not arouse any doubt. We know that the ocean is rising most rapidly in that part of the Pacific, while the South-East Asian coast and the adjacent islands are slowly sinking. But are the numerous coral islands and atolls in the middle of the Pacific also “tombstones” oversunken land? Darwin and his supporters thought this was so. But their hypothesis was proven only a short time ago, by deep drilling on coral islands.

Coral reefs grow at a rate of about 17 to 37 metres per 1,000 years. The thicker the reef, the

older it is. Every 100 metres in the depth of a reef corresponds to roughly 50 metres of subsidence of land or shallow-water bank.

The first boring in a reef, made in 1897-98 on the atoll of Funafuti in the Ellice group, found nothing but coral rock to depths of more than 300 metres. The reef thickness may have been much greater; the drill was able to bore only to that depth. The next boring, on Borodino Island (Smith Island), south of Japan, reached a depth of 432 metres, but here too the researchers were unable to penetrate all the way through the reef.

Drillers on Bikini Atoll reached a depth of more than 780 metres in the summer of 1947. Geophysical studies showed the thickness at Bikini to be actually 1,300 metres. Later, geophysical investigation of the Eniwetok Atoll revealed its coral thickness to be about 1,500 metres. This means that land in this region has sunk about 1,500 metres, an impressive figure even for the Pacific.

When did the Darwin Rise begin to subside? Volcanism reached its height in the Pacific between 60 and 100 million years ago, after which the Darwin Rise started to sink. Many volcanoes became extinct. Their peaks were levelled by the waves, and they turned into shallow-water banks. According to Menard, sinking took place throughout almost the entire area except in the region of the Tokelau group and, possibly, two shallow-water sections in the northwestern ocean. The collapse amounted to almost two kilometres. Despite the subsidence of numerous islands many of them still served as stepping-stones for biological migration because growing coral colonies kept the peaks of the

islands at sea level. Volcanoes that disappeared beneath the waves were replaced from time to time by new groups of volcanoes.

Sunken Islands of the Pacific

The sinking of the Darwin Rise is connected, some scientists say, with the Early Cenozoic era, when great changes ushered in the present period of geological history.

Volcanism continued in the Pacific in the Early Cenozoic era. But the Mid-Pacific Mountains and other underwater ridges now lying at a depth of many kilometres gradually began to sink. Coral islands and atolls started to grow in place of the submerged Tuamotu Ridge; other oceanic volcanoes and mountains also acquired their coral "tombstones". Some, however, were unable to leave traces of their existence on the surface of the ocean. Coral colonies did not settle on their peaks, the peaks were planed almost flat by wave erosion, and today a tremendous number of submarine volcanoes—called guyots—with broad, almost flat, tops is to be found in the Pacific.

While the Darwin Rise was sinking, the East Pacific Rise, stretching all the way from the Gulf of Alaska to the Galapagos Islands, was born. The East Pacific Rise is one of the largest sections of the chain of abyssal ridges that encircle the globe.

The Hawaiian Islands rose, and so did many other volcanic islands of the deep basin. Some of the present atolls were elevated and forested for a time and then again subsided. New islands arose and then sank in the eastern part of the Pacific.

The Gulf of Alaska and the west coast of the United States had islands that cannot be found on maps today. Numerous islands and banks were present in what is known as the Baja California Seamount Province and on the ridge that runs near the Pacific coast of South America.

Simultaneously the so-called Melanesian Rise may have developed in the Southwestern Pacific, although oceanographers are still debating its existence. According to Menard, "Melanesia is structurally complex and little known, and not much can be said about it that is not conjectural". The Chatham Rise east of New Zealand was likewise at sea level, forming a very extensive bank.

There was a time when scientists, influenced by the Bible, believed in the idea of a great flood. When viewed not as God's punishment for man's sins but as an actual event, a flood explained many facts that science could not yet explain, such as the discovery of fossils of fishes and sea-shells on mountains. Early in the 19th century, the famous French naturalist Georges Cuvier advanced a theory of cataclysms, according to which life on earth is periodically destroyed by great "explosions", such as volcanic eruptions, earthquakes and floods, and then, like the Phoenix, is resurrected.

Before very long, however, Cuvier's theory of cataclysms was refuted by the large amount of data collected by new sciences like oceanography, paleontology, geology and climatology. By the beginning of our century, one hundred years after Cuvier, the majority of scientists held a diametrically opposite view, believing that the earth's crust, very old, was little affected

by the turbulent events taking place inside the earth and reacted to them—in the shape of earthquakes, floods and volcanic eruptions—only in exceptional cases and on a local scale.

However, each decade of the 20th century has brought new discoveries that enable us to penetrate deep into the bowels of the earth and down to the ocean floor. The data that science has accumulated speak of the opposite. Although the earth is thousands of millions of years old, very substantial changes are still taking place. The earth's crust can be "rejuvenated"; continents and oceans can change their outlines; plains can turn into mountains or sink below sea level.

Neotectonics, a science concerned with movements and deformations of the earth's crust during the past 25 million years (the name "neotectonics" was proposed by Academician Obruchev in 1948), has developed into an independent branch of geology with a promising future.

When measured in human terms, 25 million years is an enormous span of time. But it is only a tiny fraction of time in the history of our planet.

In the past 25 million years the face of the earth has undergone important changes, whether in the relief of the mountains or the contours of the oceans. The greatest mountain ranges—the Himalayas, Pamirs, Alps, Caucasus, Cordilleras and Andes—have developed in this period, as has the present Pacific basin, with all its underwater mountains and ridges, islands and archipelagoes, coral reefs and atolls, inner seas and island arcs.

Still, modern earth science considers 25 million years too long a period. The time scale has to be reduced if we are to understand the pro-

cesses that have given our planet its present appearance.

The Quaternary, the geological period during which man became *Homo sapiens*, a period that has lasted about one million years, up to the present time, was previously considered to be the least significant division in geological history. But more and more new scientific findings are changing the attitude to the Quaternary.

The rise of *Homo sapiens* took place against a background of extremely abrupt climatic shifts and contrasts. Grassy plains turned into barren deserts, which again became covered with vegetation, and then again turned into sands. (Take, for example, the Sahara, the world's largest desert, where man has lived since remote times.) In the north, great glaciers advanced and retreated, causing the ocean level to fall and rise. The relief changed as well as the climate. Mountains rose, volcanoes erupted (Mt Elbrus in the Caucasus was an active volcano several thousand years ago), and the configuration of the ocean floor was altered. Along with the climate and the relief the organic world of our planet also changed.

The appearance or melting of glaciers in the temperate zone led to fluctuations in sea level. An idea of how great these were can be gained from the International Geophysical Year data on the approximate volume of ice that covers Antarctica and parts of the other continents. If this ice were to melt, the level of the World Ocean would rise 66 metres, and many cities and tracts of land would be drowned.

When cold set in on earth the accumulation of glaciers enormously lowered the sea level, exposing land that had been covered in places

by as much as hundreds of metres of water. When it grew warmer the glaciers began to melt, the sea level rose, and land was submerged. This process has taken place several times throughout the Quaternary period.

Exactly how many times we do not know. Some scientists believe the ocean rose and fell greatly at least three times. Others set the figure at four, seven and even twelve times. There is also a view that there was only one vast glacial epoch broken by short warm periods. Finally, there are scientists who maintain that our planet had no ice age at all!

These questions of Quaternary period geology and glaciology are indeed highly interesting, but we shall not go into them here. The important thing as far as the present subject is concerned is merely to note that individual parts of the Pacific as they are today—the shape of coastlines, islands, etc.—developed after *Homo sapiens* had come on the scene and was beginning to explore and settle his planet.

The marginal seas of the Pacific—the Sea of Japan, the Sea of Okhotsk, the Yellow Sea, the Bering Sea and the inner seas of Indonesia—acquired their present shape only at the end of the last glacial epoch, about 10,000 to 12,000 years ago. The Pacific coasts of Asia, America and Australia preserve traces of the rise and fall of the ocean level. Underwater banks, guyots and shallows were islands and islets not so long ago. In a word, man was a witness to the last great changes in the relief of our planet—and more than merely a passive witness, at that.

During the glacial period the ocean level was much lower than it is today. Chains of land bridges ran from island to island, from archipel-

ago to archipelago. Along these bridges the primitive explorers of the Pacific ventured ever farther out into the ocean, peopling more and more archipelagoes.

What is more, that is how the American and Australian continents were in all likelihood settled in the remote past. Land bridges enabled primitive Columbuses to discover the New World thousands of years before Columbus, and Australia thousands of years before Captain Cook and the Dutch seafarers.

Bering Land

For a long time scholars, particularly American scholars, attempted to prove that *Homo Amerindus* was descended from a special offshoot of anthropoid ape or a special species of Neanderthal man. But the facts contradict that. The New World could not have been the cradle of man. Long before Columbus the New World was discovered by men from the Old World, who peopled the American continent and were the ancestors of the Indians. Who were those men? When and how did they come to the New World?

The hypotheses advanced over the past four centuries to explain the origin of the inhabitants of America and the riddle of their high civilizations, which were barbarously destroyed by the conquistadors, make a fascinating story. Who, indeed, has not been put forward as the forefather of the indigenous population of the New World! The list of "candidates" includes the ancient Egyptians and the no less ancient Sumerians of Mesopotamia; the Basques on the coast

of the Atlantic and the Japanese on the other side of the world; the nomad Huns and the seafaring Phoenicians; the Cretans, Israelites, Scythians, Normans, Persians, Greeks, Celts, Hittites, Romans, Khmers, Indians, Africans, Chinese and, finally, the inhabitants of mythical Atlantis.

Fantastic hypotheses continue to appear. Along with the hypotheses the past four centuries have seen the accumulation of evidence—linguistic, anthropological, archeological and ethnographic—that the culture of the American Indians is an original culture, the outcome of long internal development.

Americanology is a young science in which very much is still debatable and hypothetical. Investigators do not have either a precise chronology or the historical sources possessed by students of the civilisations of the Old World (the hieroglyphic inscriptions left by the American Indians have not yet been deciphered). Nevertheless, the majority of Americanists believe the origin of the American Indians to be basically a settled question. The first explorers came to the New World from Asia. The American Indians are an enormous branch of the Mongoloid race. Anthropology and genetics indicate this, as do the splendid works of art of pre-Columbian America. Ancient sculptural monuments and clay statuettes fashioned several thousand years ago depict people with slanting eyes and other marked Mongoloid features.

How many years were the first settlers of America ahead of Christopher Columbus? When did man first set foot on New World soil? So far, no exact answer can be given to this question. The most modest estimates say 15,000 years ago.

Dick Edgar Ibarra Grasso, the Bolivian archeologist and ethnographer, puts it at 50,000 years. The truth probably lies somewhere in between, which would be that man first appeared in America 30,000 to 40,000 years before Europeans came there.

How did he get to the New World? It was clearly beyond the powers of Paleolithic man to sail across the ocean, for he did not make either boats or rafts that could have negotiated the many hundreds of miles between Asia and America. At either end of the New World, though, the distances are not particularly great. Only small expanses of water separate Alaska from Chukotka and Tierra del Fuego from the North Antarctic.

According to the Portuguese anthropologist Mendez-Correa, America was peopled by way of Antarctica at a time when the Antarctic continent was not yet covered with ice; man first reached Antarctica from Australia, and from there journeyed to Tierra del Fuego. This bold hypothesis is refuted by many facts. In the first place, the Fuegians have no features in common with the Australians; secondly, Antarctica was covered with ice long before *Homo sapiens* appeared on earth; thirdly, Australia was peopled later than America; and fourthly, the most important point: the peopling of the New World proceeded from the north to the south and not the other way. People appeared in South America between 13,000 and 15,000 years ago, but the shores of the Strait of Magellan and Tierra del Fuego were settled only at the beginning of our era. The oldest traces of human habitation found on the territory of the United States date back more than 25,000 years!

Man could not have reached America by sea. He could not have crossed the ocean 25,000 years ago. That means the first explorers reached the New World not by the southern Tierra del Fuego-Antarctic route, but by the northern route, from Chukotka. Yet no traces of ancient man have been found on either side of the Bering Strait. Probably those traces now lie not on land, where archeologists have been searching for them, but under water.

Bering Land is what some geologists call the land which once existed in place of the present Chukotsk Sea and northern part of the Bering Sea. Rocky St. Lawrence Island and the two Diomede islands are remnants of this land mass. This is the bridge which primitive man probably used to cross over from Asia into America. Americanists are not yet certain as to what part of the vast Asian continent provided the first settlers of the New World. But each passing year furnishes more evidence that the area was probably the Soviet Union's Far Eastern seaboard and the Kamchatka Peninsula.

In 1964 an archeological expedition of the Siberian Department of the USSR Academy of Sciences under N. N. Dikov found, on the Kamchatka Peninsula, a site that is from 14,000 to 15,000 years old. This dates back to approximately the time when the Bering Sea land bridge was used as a route to the American continent. The most notable thing about the finds is that they show connections between the ancient Kamchatkan culture and the Indian cultures of America. For instance, Soviet archeologists found a large number of beads and pendants that are strikingly reminiscent of the famous Indian wampum. The arrowheads used by the

ancient inhabitants of Kamchatka also have much in common with those of the American Indians. Further, both used red ochre in their burial rites.

The location, antiquity and largely Americanoid nature of this first Paleolithic monument discovered in North-East Asia are all new and impressive evidence that early settlers of America (although perhaps not the original settlers), came from Asia via the extreme north-east, in particular, via the Kamchatka Peninsula and the ancient land mass connecting Asia with America in the north.

Bering Land began to sink at the end of the last glacial period, between 10,000 and 12,000 years ago. Traces of the primitive explorers, camp sites, stone and ivory implements and, possibly, burial sites similar to the one which Soviet archeologists have found on the Kamchatka Peninsula, all disappeared beneath the waves. Underwater archeologists will probably come upon these traces some day and add data brought up from the floor of the Chukotsk and Bering seas to the "land data".

Perhaps the route to the New World did not lie so far to the north. After all, the Komandorskiye and Aleutian islands stretch in a long chain between Kamchatka and Alaska. There is both oceanographical and geological evidence that land subsidence took place there not so long ago. A group of guyots, or underwater volcanoes, whose peaks once rose above the surface, has been discovered in the Gulf of Alaska. (For example, the Dickens Guyot lies at a depth of only 475 metres; it is surrounded by depths of 3,000 to 3,500 metres.) This indicates that underwater archeologists may look forward to interesting

discoveries not only in now submerged Bering Land but also much farther south.

The great Alaskan earthquake of March 1964 substantially changed the surrounding topography. It may be assumed that in remote times even more significant movements of the earth's crust took place south of Bering Land, that the ocean swallowed up many kilometres of coast and drowned many islands and islets.

When originally settled, a large part of North America was covered by a vast ice cap. The newcomers could advance only through narrow passages free of ice. Their route lay along a now submerged coastal strip of the Pacific Ocean.

The enormous underwater canyons along the west coast of the United States and Baja California indicate that there was once land where the ocean is now. Many of the submarine canyons come up almost to the shore and are amazingly similar to the canyons on land both in shape and structure.

An astonishing find made by scuba divers in the area of La Jolla Canyon near the Gulf of California shows that people once lived in places now at the bottom of the ocean. From the floor of the Pacific the divers brought up a large number of metates, stones which Indians have used for grinding cereal seeds since the most ancient times.

This is the only discovery of its kind. But it should be remembered that La Jolla is probably the most thoroughly studied area of the submarine Pacific, for the Scripps Institution of Oceanography, the largest centre in the world studying the ocean, is located there. If the floor along the whole Pacific coast of America is

studied with equal thoroughness we may look forward to a great many astonishing finds that will put the Indian metates in the shade.

Andes Land and the Secret of Tiahuanaco

A search for traces of primitive Columbuses on the floor of the Pacific Ocean is certainly a worthwhile and interesting occupation. Still, scuba divers seem more drawn to the idea of looking for the remains of sunken cities, with their temples, palaces, works of art and undeciphered writings. It may be that the key to the secrets of the origin of the South American civilisations lies at the bottom of the Pacific.

In Central America scholars have established the sequence of cultures and the general features of their development from primitive hunters and gatherers through agriculturists to the creators of great civilisations. There is a relatively precise chronology for Central America since many Central American monuments have hieroglyphic calendar dates.

In South America, however, the investigator encounters a large number of cultures whose age he does not know either absolutely or relatively, that is, he does not know which culture preceded which. Excavations in Peru, Bolivia, Ecuador and Chile have revealed hundreds of archeological cultures. Archeology has worked up the chronological framework of these South American cultures, their dispersal, interconnections and in some cases their sequence, to a far less degree than it has for the peoples of Central America. A single new discovery often upsets the existing pattern and makes it necessary to construct a new one. To this day many points are still



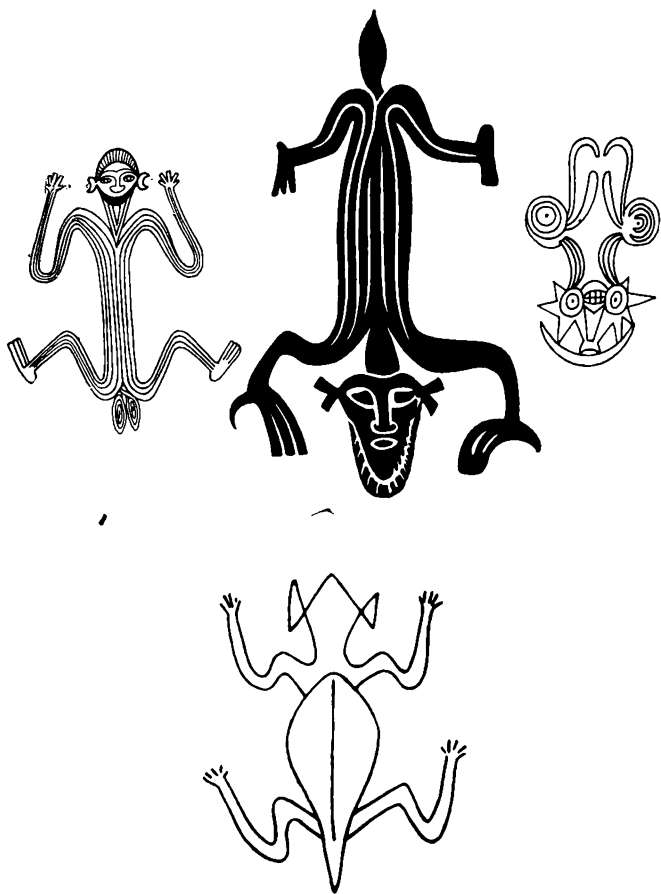
Easter Island rock carvings have been ravaged by time



This Easter Island statue, called the Hoa-Haka-Nana-Ia, stood in the British Museum for nearly half a century before symbolic signs and drawings were discovered on its back

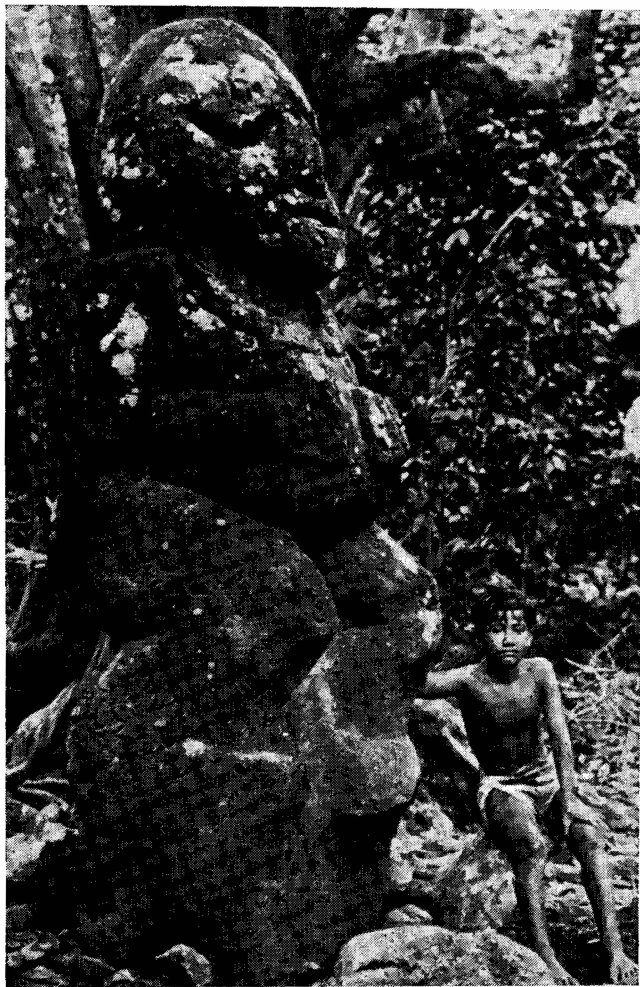


Drawings of a bird-man from the caves of Orongo on Easter Island



Some of the decorative motifs and figures in Easter Island art resemble those of ancient Greece

This fantastic lizard-like man, called the Tangata-Moko, is found on Easter Island rock carvings, among the characters of the *kohau rongorongo* script and is represented in figurines



Enormous stone statues have been found on Easter Island and other islands of Eastern Polynesia. Their origin and purpose are still a mystery

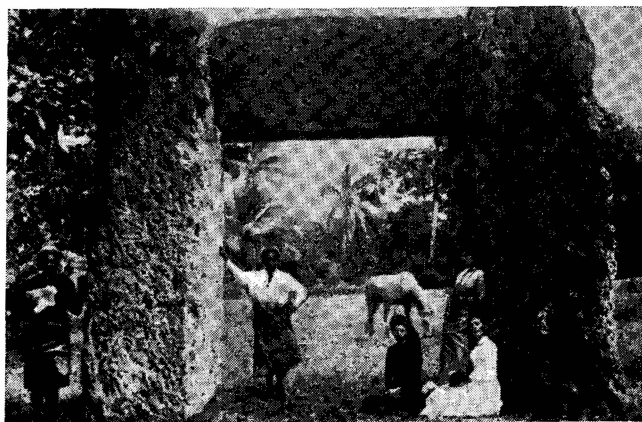
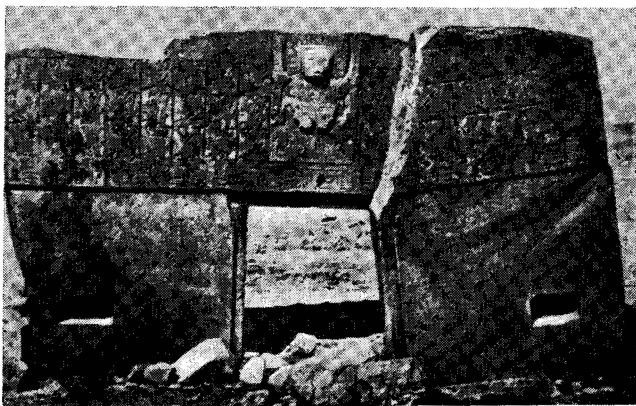


Is the striking resemblance between the wooden idols of the North American Indians and those of the Polynesians just a coincidence? No, it indicates ancient contacts, say Thor Heyerdahl and supporters of his theory. If they are right, could not these contacts have been facilitated by now sunken islands and islets lying between America and Polynesia?






When La Pérouse visited Easter Island in 1786 he found the giant statues still standing on their platforms. The statues were crowned by tall cylindrical hats

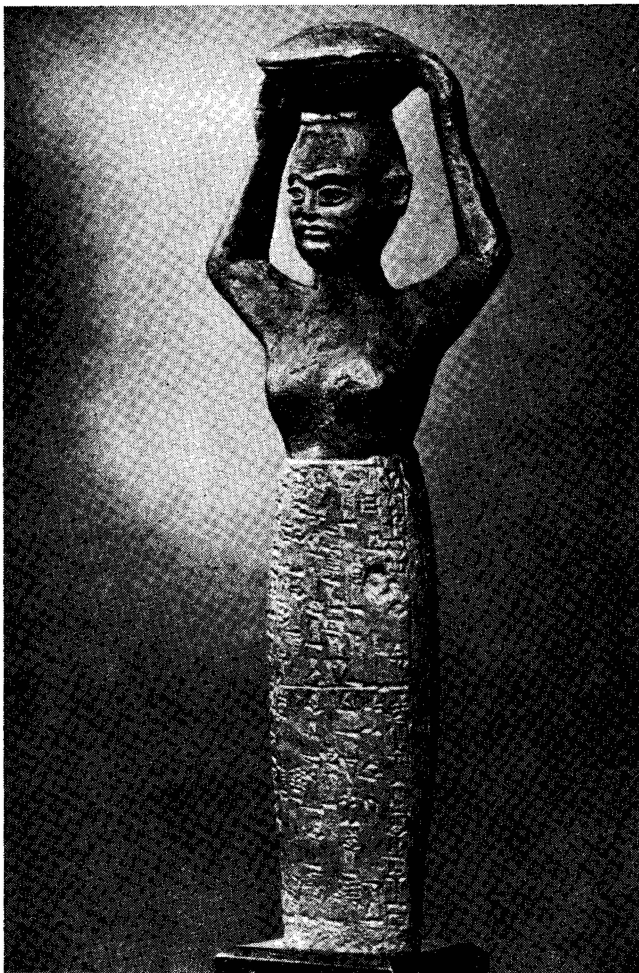


The Sun Gate in Tiwanaco

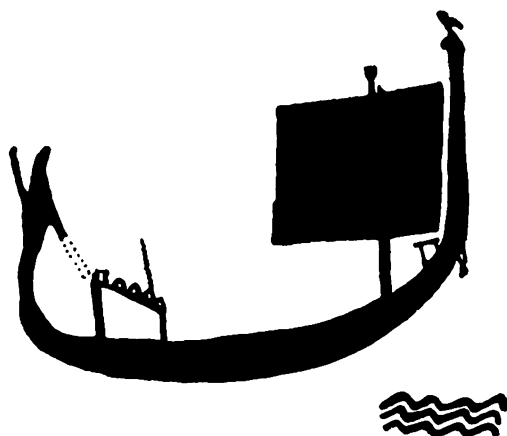
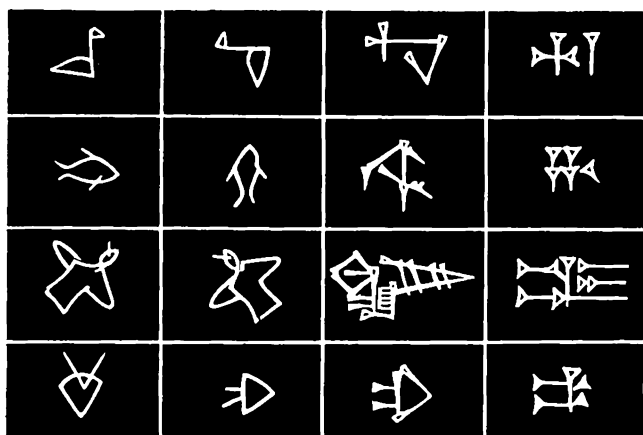
The "Triliton", a huge stone gateway on the Tonga Islands in Western Polynesia

This drawing on a proto-Indian seal with a hieroglyphic inscription is believed by most scholars to be a prototype of the great god Siva, the mythical creator of the teaching of Tantra. The "proto-Siva" is sitting in a yoga posture



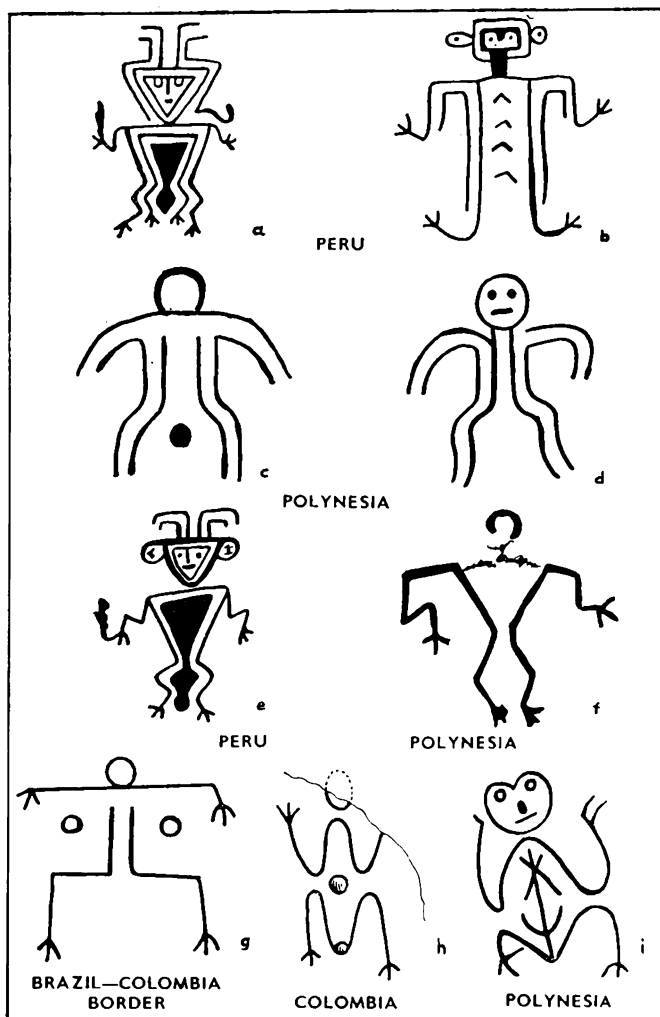


West of Mesopotamia, in a land called Elam, a civilisation that had affinities with the ancient cultures of Mesopotamia and the Indian subcontinent flourished between 4,000 and 5,000 years ago. Might not these three ancient cultures have a common origin? This bronze statuette in a Berlin museum bears an inscription by Kutur Mapuk, who ruled Elam in the 18th century B.C.

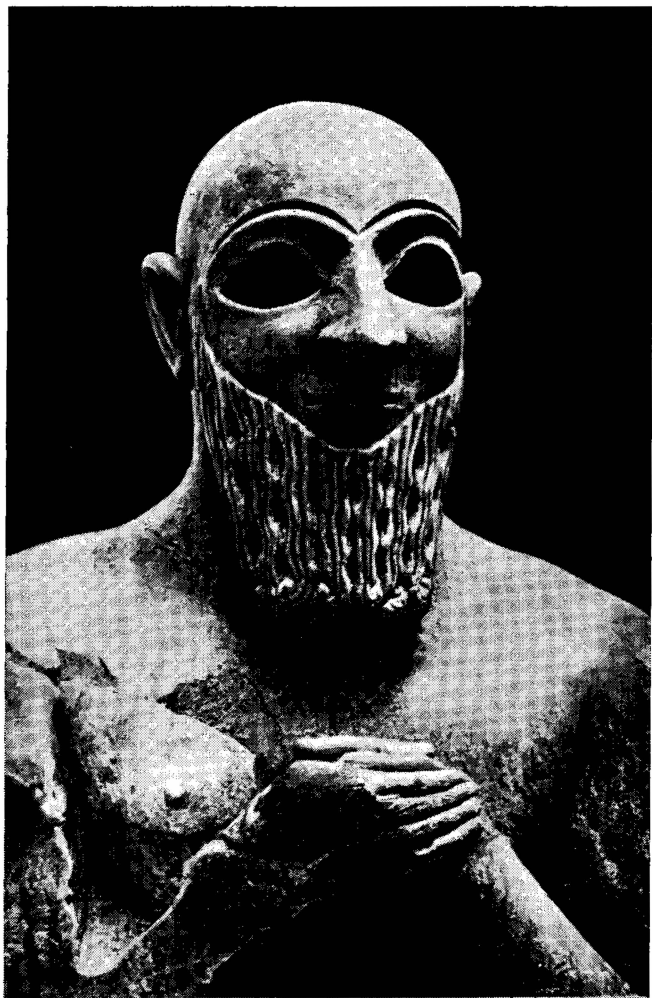


The Mesopotamian script developed from drawings to combinations of wedges. The oldest symbols (far left) of what is known as the "proto-Sumerian" writing resemble in many ways the signs used in writing in Elam and India, lands that were the neighbours of Mesopotamia

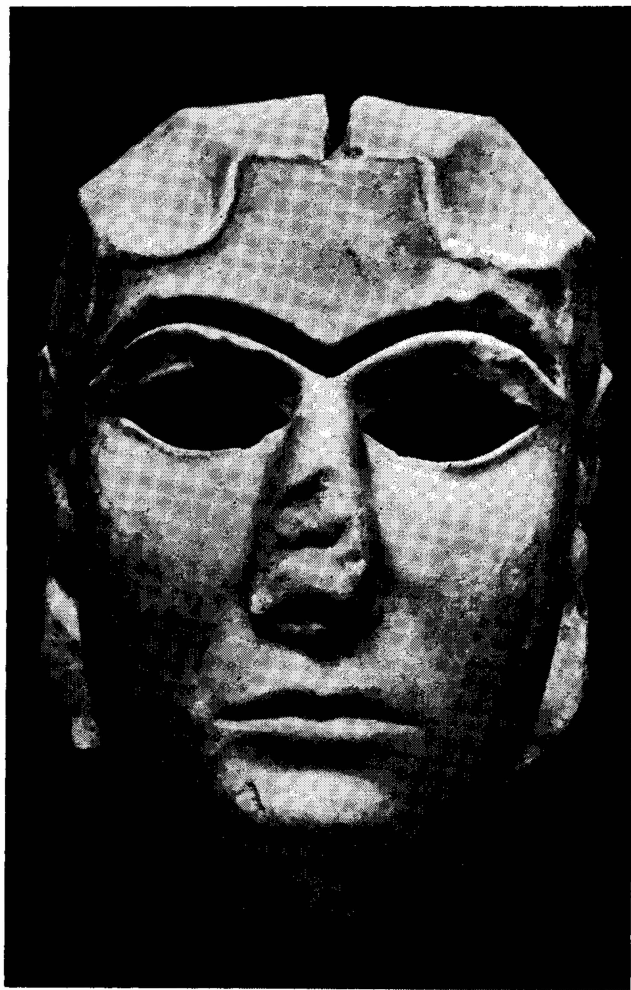
The ancient Egyptians did not sail along the Nile in ships with a high stern, like the one depicted on a clay vessel found in Egypt. In the Red Sea area, however, drawings of these "foreign" ships are found fairly often. A number of scholars think that men from the Persian Gulf visited Egypt in them; others believe that the voyagers came from the Indian subcontinent. Could these ships have come from the enigmatic land of Melukha or the equally mysterious land of Dilmun?



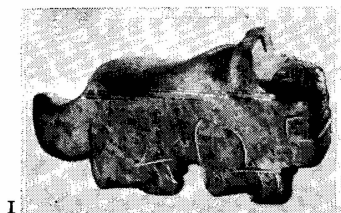
Figs a, b and e are Peruvian spirit emblems. Figs c and d are petroglyphs of a type common in the Marquesas and Society islands. This peculiar type of Polynesian petroglyph represents, like so many of the Peruvian spirit emblems, an anthropomorphic figure drawn in two parallel lines in such a way that the body is not joined at the hips. Fig. f is a petroglyph from Kauai, Hawaii. The petroglyph of this type agrees remarkably with spirit emblems in early Peru. Fig. g is a petroglyph from the Brazil-Colombia border, and Fig. h is one from Rio Cuduary in Colombia, introduced merely by way of its strong resemblance to the Moriori figure, Fig. i, which was carved on a trunk of a Chatham Island *Kopi* tree



This is Idi-Narum, a Sumerian official. The appearance and anthropological type of the oldest inhabitants of the valley of the Tigris and the Euphrates are remarkably like those of the men who created the proto-Indian civilisation



Alabaster head of a Sumerian woman of the city of Uruk. The eyebrows and eyes were once inlaid with semi-precious stones. The bust is now in a museum in Baghdad, capital of Iraq



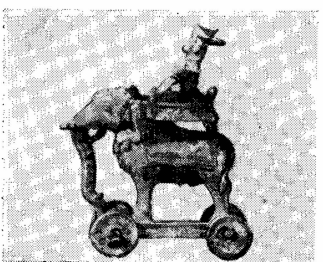
I



II



III



IV



I. Feline divinities were worshiped by China's Shang Dynasty (left) and by both the Olmecs of Mexico and the Chavin civilisation of Peru (right). II. Lion-headed thrones are shown in representations of deities in India (left) and of Maya dignitaries (right). III. Lotus friezes adorn both Maya and Indian temples. Remarkable similarities occur between these two designs, which portray men reclining between winding lotus stems which they grasp in both hands. IV. Wheeled animals made in India may have inspired similar figures found in Mexican tombs

debatable and South America's ancient history remains vague.

The best known and yet most enigmatic site in South America is called Tiahuanaco. It is located in Bolivia, near Lake Titicaca, the highest of all inland basins. The site consists of the ruins of a series of monumental stone buildings. The chief structure, called the Sun Gate, is a portal built of enormous stone slabs decorated with bas-reliefs depicting imaginary or highly stylised creatures.

In the 1930s two scholars, Arthur Posnansky and Edmund Kiss, attempted to decipher the bas-reliefs on the Sun Gate by treating them as signs of a calendar. Before they had been proven right or wrong, the enthusiasts discovered an amazing resemblance between the "Tiahuanaco calendar" and the calculations made by Hanns Hörbiger, author of an original cosmogonic hypothesis to the effect that the moon is not an "eternal satellite" but a fairly late acquisition, dating back only a few tens of thousands of years.

A science-fiction writer, Hans Schindler, who used the pen-name Bellamy, hastened to combine the doubtful Posnansky-Kiss translation of the characters on the bas-reliefs with the still more doubtful theory of Hörbiger and created a neat, elegant hypothesis that took care of all the unsolved problems in oceanography, archeology, geology, ethnography, folklore and so on, at one stroke.

According to Bellamy, the Moon's original orbit passed between Mars and the Earth. But one fine day the moon was drawn into the earth's field of gravitation and became a satellite of our planet. The new satellite proved to be a danger-

ous acquisition. It immediately had a disastrous effect on the earth's atmosphere, hydrosphere and lithosphere. Hurricanes of unprecedented force swept across the globe, floods wreaked havoc in many low-lying places, intensive volcanic activity set in, and mountain ridges lifted up out of the bowels of the earth. The catastrophes destroyed the prehistoric civilisation, of which the Tiahuanaco monument, the calendar on the Sun Gate, is one of the relics. It was an island culture, not a continental culture, says Bellamy, because the Andes in the region of Tiahuanaco was once a vast island in the Pacific, Andes Land.

Bellamy's hypothesis is farfetched, to put it mildly. Although actually based only on a calendar that has not been authentically deciphered, it runs counter to fundamental findings of oceanography, geology, astronomy, archeology and many other sciences. The reason why we have mentioned it here is to show that even the most fantastic assumption sometimes contains a grain of truth. For in recent years two discoveries have been made in the Andes area that will undoubtedly open up a new chapter in the history of underwater research.

First, investigations at the bottom of Lake Titicaca by archeologists, with the collaboration of the Argentinian Diving Federation, revealed, a couple of hundred metres from the shore, a group of structures more than one kilometre long. The structures include a paved area of several hundred square metres and about 30 walls placed geometrically, in parallel rows.

Is this a drowned city? Or the remains of a temple that stood on the shore of the lake? Or is it the necropolis of Tiahuanaco, for not

a single burial site has been found in that vast complex? We do not know as yet.

Nor do we know why the structures are now below the surface. (Lake Titicaca lies at a higher elevation than Mt Fuji and only 1,000 metres below Mont Blanc.) Despite their height and grandeur, the Andes are young mountains. They developed towards the end of the Tertiary period. Before that Lake Titicaca was not the highest lake in the world but an ordinary sea gulf, as evidenced by the skeletons of marine animals found there. In the Tertiary period the Andes began to rise, and the lake was cut off from the ocean.

The water level of the lake alternately rose and fell, which is perhaps why the builders of the Sun Gate and the other vast structures abandoned Tiahuanaco. By the time the first Europeans reached the site, the local inhabitants could tell them only legends about the people who had erected those structures. One of the occasions when the level of the lake rose (perhaps, owing to a heavy snowmelt in the mountains) might have caused a "flood" at an elevation of four kilometres.

The discovery of ancient ruins at the bottom of a lake is extremely interesting but not particularly sensational. The discovery of a sunken city in the ocean, at a depth of almost two kilometres, is truly an extraordinary happening. If this discovery is shown to be authentic it will open up immeasurably broader vistas before underwater archeology, which may possibly begin to investigate the abyssal depths as well as the continental shelf. Archeologists will, of course, require more sophisticated equipment; scuba divers could not cope with the job.

The purpose of the oceanographic expedition under Robert Menzis that was sent to the coast of Peru in the mid-sixties by the marine laboratory of Duke University, in the United States, was to study the fauna in Peruvian waters, which are rightly called the "richest waters in the world". For six weeks the expedition investigated the Milne-Edwards Basin not far from the port of Callao. Here, for a good 1,000 kilometres, the ocean floor lies at a depth of almost six kilometres. But suddenly the oceanographers found, to their amazement, that the underwater cameras they raised from a depth of about two kilometres (6,000 feet, to be exact), had recorded the ruins of an ancient city! Stone columns, many of them covered with carvings that were either ornamentation or hieroglyphic inscriptions, were clearly visible in the photographs.

Shaken by the discovery, Robert Menzis and his companions started a search closer to Callao, which is a very old port. Using a depth recorder, they found stone columns on the sea floor. Does not this indicate that a continuation of Callao should be sought out in the Pacific?

The Andes area is one of the most unstable regions of the globe. Earthquakes are frequent there for the Andes are still continuing to rise. The biggest and strongest disturbance of the earth's crust ever recorded by modern instruments occurred in that region on May 22, 1960. Starting in the ocean, not far from Valdivia, Chile, the earthquake reduced a large number of towns and cities along the Pacific coast of South America to ruins. Enormous tidal waves crossed the entire Pacific. Subterranean shocks, landslides and volcanic eruptions devastated a territory larger than Great Britain. In such a seismic

zone it is quite possible for entire cities to sink to the bottom of the ocean.

Oceanographers and geologists say that part of the coast in the region of Callao sank beneath the waves comparatively recently, deepening the Milne-Edwards Basin by 200 metres. When did this take place? Archeologists, rather than geologists, may be able to answer this question after they investigate the underwater ruins near Callao.

As to the mysterious city spotted at a depth of 6,000 feet, Robert Menzis dreams of studying it with the help of a small submarine, since it cannot be reached by divers. If there really is a city there and not just a chance accumulation of rocks and stones this will be, says Menzis, one of the most thrilling discoveries of the 20th century.

From the Andes to Easter Island

It well may be that only underwater exploration, whether at the bottom of Lake Titicaca or in the Pacific deeps, will solve the riddle of the ancient civilisations of South America. When conquered by the Spaniards in the 16th century, the Incas ruled a territory of some 2,000,000 square kilometres, stretching for more than 4,000 kilometres along the Pacific coast.

The unique civilisation of the Incas, which the conquistadors barbarously destroyed, was based on still older cultures. Some scholars are inclined to think that the roots of the latter go back to the civilisation of Ancient Egypt which, they hold, lies at the foundation of all the great cultures of antiquity. Some believe that the roots go back still farther, to Mesopotamia. And some think

the civilisations of South America owe their origin to the most ancient culture of the New World, remains of which are hidden in the "green hell" of the Amazonian jungle.

Professor Posnansky concluded that not only the Sun Gate at Tiahuanaco but the entire complex of monumental structures represents "a gigantic stone calendar reflecting astronomical phenomena" that took place about 20,000 years ago. Indian legends say that the first human settlement on earth arose at Tiahuanaco and that human culture was born there. In his book *Tiahuanaco, the Cradle of American Man*, Professor Posnansky maintains that the archeological findings and his "deciphering of the complex" prove that the Indian legends are true.

The earliest Old World sites date back no more than 8,000 to 9,000 years. If Posnansky is to be believed, they are half as old as Tiahuanaco. Bellamy increased the age of the Tiahuanaco complex to 250,000 years, while the French writer Denis Saurat estimated it to be as much as 300,000 years. Finally, Alexander Kazantsev, Soviet science-fiction author, announced that the famous Sun Gate calendar was not made here on earth at all but had been left as a memento by visitors from Venus.

As the reader can see, it is not such a long way from shaky hypotheses to the realm of pure fantasy. But let us leave the realm of fantasy to the science-fiction writers.

Americanists now believe that the Sun Gate and other Tiahuanaco monuments were built between the 6th and 10th centuries A.D., and by the local inhabitants, the Indians, instead of by Egyptians, Mesopotamians or visiting Venusians,

Indeed, why look for outsiders who might have built Tiahuanaco? Might it not have been the other way round, that the builders of that great architectural complex, people possessing a high culture, influenced other cultures? Archeologists have found undisputed evidence that the Tiahuanaco civilisation strongly influenced the later cultures of ancient Peru and Bolivia. At the edges of the area over which the Tiahuanaco culture spread, in Colombia, individual centres of this civilisation lasted right up until the Spanish invasion. Could it have spread even farther, not only through South America but also westwards, into the ocean, until it reached the islands of Polynesia?

This question was posed by the famous Norwegian explorer Thor Heyerdahl. There is no need to retell his fascinating book *The Kon-Tiki Expedition*, for all his arguments in support of that hypothesis are set forth in it with sufficient clarity. The next step was taken during excavations on the Galapagos Islands.

These islands in the eastern part of the Pacific occupy a splendid strategic position. But that is not why they interest scientists. Oceanographers closely study the interaction of two powerful currents, the warm South Equatorial Current and the cold Peru Current, which meet at the Galapagos. The flora and fauna provide naturalists with rich material for comparisons and generalisations. It is not surprising that the remarkable world of the Galapagos, where flora and fauna of the tropics and the arctic regions live side by side, helped Darwin to arrive at his theory of evolution. (Darwin stopped at the islands during his voyage on the *Beagle*.)

Tropical lianas and arctic mosses, bright-

coloured jungle birds and antarctic seagulls, parrots and penguins, cold-loving seals and heat-loving giant tortoises are some of the striking contrasts found on the Galapagos Islands. But perhaps the best known of the Galapagos fauna are the iguanas, large lizards that look like mythological dragons.

It was long thought that the Galapagos Islands were a unique preserve unknown to man until the arrival of Europeans. Only recently, however, it was discovered that not only oceanographers and naturalists but archeologists as well can find much of interest there.

Botanists were the first to point this out. Among the flora of the archipelago they found a number of species that were cultivated by the coastal Indians of Northern Peru. From this they concluded that people had once lived on the islands.

The hypothesis was confirmed during archeological excavations organised and headed by Thor Heyerdahl of *Kon-Tiki* fame. It seems that men visited the Galapagos Islands many centuries before the islands were discovered by Europeans.

The Heyerdahl expedition found about 2,000 objects on the islands, including stone-ware, potsherds, vases and vessels covered with decorative patterns. The objects were made in different styles of workmanship and belong to various periods and to the various cultures that existed along the Peruvian coast before the Spanish conquest. The Galapagos Islands must have been well known to the Indians who sailed the ocean on their balsa rafts.

Why did they abandon the islands? The layers of lava covering the remains of some of the ancient sites suggest the reason. Volcanic erup-

tions some centuries ago evidently forced the Indians to leave the islands and return home. Or perhaps lava flows wiped out the inhabitants. The Galapagos flora and fauna suggest that the archipelago was once connected with the mainland. True, the fact that relict flora and fauna are preserved there indicates that the land bridge must have sunk very long ago. It may be, though, that some bridges, in the shape of islands and islets, remained on the surface for a long time, and it was by way of these that Indian seafarers made their way to the Galapagos archipelago.

Europeans were unable, for a very long time, to find the Galapagos Islands and for that reason called them the Enchanted Isles. Yet they had compasses and well-equipped ships. How, then, could Indians with their vastly inferior navigational techniques have made regular voyages over the course of a long period, as is shown by the pottery found on the islands? It is quite possible that dry tracts, now at the bottom of the Pacific, served them as reference landmarks and even stopping places.

A long underwater ridge named after Cocos Island, the only patch of land remaining above the water, stretches from the shores of South America to the Galapagos archipelago. Cocos Island is famous for treasure which, say old maps and documents, is hidden in its caves or buried along its shores. But underwater research may bring treasure of another kind—archeological treasure—to light on this “treasure island”. It may be that Cocos Island and the Galapagos group served, along with other islands and islets in this part of the Pacific, as way stations for Indian navigators,

Two chapters of Thor Heyerdahl's recent book, *Das Abenteuer einer Theorie* (*The Adventures of a Theory*), convincingly support that idea. Traces of visits by Indians have been found on the Galapagos. Another piece of evidence are the plantations of coconut palms that must have been laid out on Cocos Island long before Europeans first came there. In Heyerdahl's opinion, Cocos Island, which lies on the route from Ecuador to Guatemala, was an ideal intermediate harbour in the open sea between the two great cultural areas of pre-Columbian America, the Andean and the Central American. Today scholars are finding more and more evidence of the contacts that existed between those two cultural areas many centuries ago. It is quite possible that contacts were maintained not via land—through the almost impenetrable forests of Colombia and Panama—but via the sea. Other islets, which are now submerged, as well as Cocos Island, may have helped to make the water route easier.

The Andes is the name applied to the great mountain system which extends along the full length of the Pacific coast of South America. The eminent Soviet geologist V. Belousov believes that this range is only the eastern part of a vast zone, the western part being under water. Of the submarine mountains and the Albatross Plateau that were once above water, says Belousov, only the Galapagos Islands and tiny Cocos Island, summit of the Cocos Ridge, remain. Investigation has shown that the ridge sank comparatively recently.

Indian mariners could have used other islets that were part of the Cocos Ridge as "landmarks" when they sailed their rafts over the Pacific.

They could have sailed in two directions: northward from the coast of Peru and Ecuador to the coast of Central America, where the Mayan and Zapotecan cultures existed, or westward, to the islands of Oceania inhabited by Polynesians.

Only underwater archeology can confirm this. The volcanic eruptions and cataclysmic earthquakes that took place in this area both on land and on the ocean floor show that the earth's crust here is still unquiet.

Describing excavations on Easter Island and on Rapa and other islands in the eastern Pacific, Heyerdahl expounds in his book *Aku-Aku* the theory that the first inhabitants of eastern Polynesia were seafarers from ancient Peru. Islands now sunken may have helped them to get across the ocean. An underwater ridge runs south-west from the coast of Peru from 15° to 28°S. Here a large group of guyots, flat-topped seamounts, was discovered not long ago, some of them at a depth of only 200 to 500 metres, which means they were mountains above water, or perhaps islands, in the recent past.

Not far from where this underwater ridge ends another begins. It runs almost parallel to 25°S for a good 2,000 kilometres. Only the sullen cliffs of Sala-y-Gómez, an island after which the ridge is named, appear above the water. Other peaks may have been visible not so very long ago. To sum up, a long chain of underwater ridges stretches from the coast of Peru straight to Easter Island, which is not far from Sala-y-Gómez Island. Islands and islets now under water may have been used by the Indians as stepping-stones and landmarks when they sailed the Peru-Easter Island route. Underwater archeol-

ogy may give us the answer to this question, a question that interests both historians and oceanographers.

Kainga Nuinui, or "Enormous Land"

What about Easter Island itself? Even if its coastline "has not dropped by a yard" since man first appeared in Oceania, as the oceanographer Chubb maintains, the islands, some of them inhabited, that Captain Davis saw could have existed in the area. Or, as most scientists, including Thor Heyerdahl, today believe, what Davis saw were other Polynesian islands, such as Mangareva and Timoe, whose appearance corresponds to his description.

Oceanographers note that the floor of the vast southeastern part of the Pacific where Easter Island is situated is remarkable in many respects. There the earth's crust is not between three and five kilometres thick, as is typical for oceanic crust, but between 20 and 30 kilometres thick, approaching the thickness of the continental crust. This area is the centre of severe earthquakes. Finally, on Easter Island geologists have found samples of rock, such as rhyolites, that are extremely rare in the Pacific and are sooner typical of the volcanoes of island arcs than of open parts of the ocean. Easter Island is part of the gigantic East Pacific Rise, a young geological formation that is still active. (The Rise, a vast underwater land on the bottom of the ocean, reaches a height of two or three kilometres. It is from 2,000 to 4,000 kilometres wide and about 15,000 kilometres long, the size of an entire continent!)

The topography and structure of the eastern part of the Pacific and the structure of the neighbouring continental shelf evidently started developing in the Early Tertiary and continue to be tectonically active; says Professor Menard. The majority of experts agree that dry land once existed in the Easter Island area. It may have been a large land mass or most probably a group of islands that later sank. But when did they sink? The same experts say this happened very long ago, before human times or, at the very latest, at the end of the last Ice Age, between 10,000 and 12,000 years ago. The culture of Easter Island cannot possibly be that old. The earliest traces of man on that mysterious island date back only to the 4th century A.D.

Of course, archeologists may find earlier traces, but it is clear that man arrived on Easter Island somewhere at the turn of our era, perhaps even a few centuries before, but certainly not *several millennia ago*. The great changes that took place 10,000 to 12,000 years ago, when the last Ice Age ended, may have something to do with the island's geological history but they cannot provide a key to the riddle of its astonishing culture. Still, there are findings that prompt us to recall the hypotheses of Menzbir, Brown and Zubov.

The only European who could have seen large numbers of *kohau rongo-rongo* wooden tablets, instead of the score or so that remain and are now in museums, was the missionary Eugenio Eyraud. Brother Eyraud reported: "In all the huts are found tables of wood or sticks covered with hieroglyphs; these are figures of animals unknown in the island." Soon after, thousands of these priceless monuments of Easter Island writing were destroyed. When the few remaining

tablets fell into the hands of Bishop Tepano Jaussen, the first man to study the *kohau rongo-rongo* hieroglyphs, he did not find any animals unknown on Easter Island represented on them, or any of the other traces of antiquity mentioned by Eugenio Eyraud. Bishop Jaussen concluded that the ancient tablets were lost to man.

The *kohau rongo-rongo* writing has not been deciphered to this day, and we can only conjecture on the meaning of those strange hieroglyphs. It is of course futile to guess what the destroyed tablets may have been like. Missionary Eyraud, not an expert in ancient scripts, may well have been mistaken, and the hieroglyphs on the missing tablets may have represented the same stylised drawings of fish, birds, plants, ritualistic and household objects, weapons, men and mythological creatures as those on the tablets that have come down to us. The conventionalised representations of the hieroglyphic script incised on hard wood with a shark's tooth could easily have bewildered him.

Now here is another point, this time relating to the field of toponymics. The Easter Islanders call their land *Te Pito o te Henua*, which means "Navel of the Universe". Thor Heyerdahl believes that Easter Island, with its developed culture, was the cornerstone of the ancient history of the Eastern Pacific, for no other island presumed to call itself the "Navel of the Universe".

Another explanation of this resounding name is possible. Many tribes and peoples, particularly those living in isolation, are inclined to consider their land the centre of the universe. (The ancient Hebrews called Jerusalem "the hub of the universe".) Both interpretations of the name of Easter Island are highly plausible, but

there is a third interpretation, given by the islanders themselves, or rather, by their ancient legends. According to these legends, the giant Uwoke (or Uoke) destroyed a vast country, leaving only Easter Island, which was called Te Pito o te Henua, or Navel of the Universe.

True, there were doubts for a long time about the antiquity of the Uwoke legend. The first collectors of folklore on the island did not mention this legend. But an analysis of the books which Thor Heyerdahl obtained when the Norwegian archeological expedition worked on Easter Island shows that the Uwoke legend goes back into the mists of time. (Heyerdahl's *Aku-Aku* describes the finding of those books, while his *Das Abenteuer einer Theorie* gives a scientific analysis of their discovery and subject-matter.)

The books contain texts dealing with the peopling of Easter Island. There is a text that was evidently a primer in a study of the *kohau rongorongo* script when there were still men who knew the hieroglyphs. Among the texts is a mention of Uwoke and "Kainga Nuinui", meaning "Enormous Land". Here is what the story of the creation of Easter Island sounds like. It is recorded in one of the books which Heyerdahl found and was translated from the language of Easter Island into Russian by the present writer.

"The youth Teea Waka said: 'Our country was once a big land, a very big land.'

"Kuukuu asked him: 'Why did the country grow small?'

'Tea Waka answered: 'Uwoke lowered his staff on it. He lowered his staff at Ohiro. The waves rose, and the land became small. People began to call it Te Pito o te Henua. Uwoke's staff broke against Mount Puku Puhipuhi.'

"Teea Waka and Kuukuu conversed at Ko te Tomonga o Teea Waka ('The Place where Teea Waka Landed'). Then *ariki* (chief) Hotu Matua settled on the island.

"This was once a big land,' Kuukuu told him.

"The land sank,' Teea Waka said. Then he added, 'This place is called Ko te Tomonga o Teea Waka.'

"Why did the land sink?' Hotu Matua asked.

"Uwoke did it. He lowered the land,' said Teea Waka. 'The land came to be called Te Pito o te Henua. When Uwoke's staff was big the land fell into an abyss. Puku Puhipuhi is the name of the place where Uwoke's staff broke.'

"That was not the staff of Uwoke, my friend,' said chief Hotu Matua. 'That was the lightning of the god Makemake.'

"Chief Hotu Matua began to live on the island."

Here the text ends. Hotu Matua, meaning Father Hotu, is well known on Easter Island. He was the first settler to have migrated to Easter Island from the east, from the distant land of Marae Renga. Kuukuu was one of the seven scouts whom, legend says, Hotu Matua sent to Easter Island before he set out on the voyage with hundreds of his people. Makemake is the name of Easter Island's most powerful god, who created man. Lightning is one of his attributes. The name Teea Waka (according to other versions of the legend, it was Ratawake or Ngata Wake) is a name that is also encountered by students of Easter Island folklore. Although legends say the island was deserted when Hotu Matua's scouts arrived, the scouts nevertheless met people, one of whom was called Teea Waka.

Diplomats are not the only ones to pass things over in silence when they make speeches. Folklore texts and legends, including those of the inhabitants of Oceania, do the same. Easter Island was evidently settled long before Hotu Matua arrived, but later the original settlers were simply erased from memory, and credit for discovering the island went to Hotu Matua. This conclusion was tentatively reached from texts which mention that Hotu Matua's scouts encountered some sort of people on Easter Island. Archeological excavations have completely confirmed this. According to the genealogy of Hotu Matua, the island's first ruler, he came there in the 15th, 13th or perhaps even the 11th century A.D. Yet we now know that the island was already inhabited in the 4th century A.D.

Perhaps the above myth of the creation of Easter Island reflects a struggle between two traditions. Hotu Matua is inclined to ascribe all achievements, including the creation of the Navel of the Universe, to his god Makemake. But the much earlier inhabitants believed the island to be the remains of a large land mass destroyed by Uwoke (Uoke) and submerged in the ocean. Could this mean that the original settlers witnessed extensive subsidences of land in that area? In the one hundred years since Schliemann's sensational excavations, archeologists and historians have learned to respect traditions and legends, no matter how improbable they may appear. Oceanographers consider that the land around Easter Island sank at least 1,000,000 years ago, and that the last significant rise in the ocean level occurred about 12,000 years ago.

Easter Island legends also mention an onslaught of the waves. It is unlikely that Stone Age man

conducted geophysical investigations on the ocean floor or knew the history of the Ice Age. It is more logical to suppose that the dwellers on Easter Island witnessed land subsidences. And this means they took place not millions of years ago but much, much later, in human times.

If that is so, there should be mention of sunken land in the myths and legends of other parts of Oceania. And there is. In the folklore and mythology of the inhabitants of other East Pacific islands and archipelagoes near Easter Island (in this case "near" means places hundreds of miles away), we find mention of "a flood" and "the destruction of a large land".

A Polynesian Continent?

The giant Uwoke appears in the folklore of the Marquesas Islands, where he is called Woke. Tracing the "creators of the world"—the mythical deities and the elements that were the forefathers of the rulers of the islands of the Marquesas Archipelago—ancient genealogies speak of the Woke who created the islands. In language and culture the inhabitants of the Marquesas Islands are very close to the Easter Islanders. Most ethnographers and archeologists agree that Easter Island was settled by people from the Marquesas Archipelago; traces of man on the Marquesas date back to the 2nd century B.C., which means they were settled a good 500 years before Easter Island. (Incidentally, one of the myths about the creation of the Navel of the Universe says that the first settlers arrived there while it was still being destroyed by Uwoke and only magic persuaded the ocean to stop flooding the land and broke the giant's staff.)

According to numerous legends taken down on the Society Islands, the Cook Islands and other East Pacific islands, enormous masses of water flooded all the land, and the islands now remaining are only the peaks of former mountains. (Oceanographers say the same thing, but they cannot agree that anyone could have witnessed this since the land subsidence took place over many thousands of years and long before man appeared on earth.)

Those acquainted with Polynesian folklore and ethnography know that the most archaic ways of life and the oldest traditions and myths are found among the dwellers of the Tuamotu coral archipelago, the group of Polynesian islands least influenced by European civilisation. Here is a legend about their ancestors, recorded on Hao Island in the Tuamotu Archipelago at the beginning of our century and translated from the Tuamotu dialect by the present writer.

"In the beginning there were three gods: Watea Nuku, Tane and Tangaroa. Watea created the earth and the sky and everything on the earth and in the sky. Watea created flat land. Tane raised it, and Tangaroa held it up. The name of this land was Hawaiiiki.

"Next, Watea created a man named Tiki and his wife Hina. He created Hina out of the side of Tiki. They lived together and children were born to them.

"People began to do evil things on this land. Watea grew angry at them for this. He ordered a man by the name of Rata to build a boat in which to take shelter. The boat was named Papapapa i Henua ('Flat Land'). It was to shelter Rata and his wife Te Putura i te Tai, and also their three sons with their wives.

"Rain fell from the sky above, and our land was flooded. Watea's wrath smashed the gates of the sky, the wind was let off its chain, the rain fell in floods, and the land was destroyed and covered by the sea. Rata, his wife and his three sons with their wives took shelter in the boat and emerged from it only after 600 epochs, when the waters subsided. They were saved, as were the beasts and the birds, as the creatures that crawl over the earth and fly in the space above it were saved, and as were their young. Time passed and the earth became populated with human beings."

All the names in this Tuamotu myth are strictly Polynesian. Watea (or Atea), Tane and Tangaroa are in the pantheon of the highest gods of the Polynesians. The story, however, is curiously like the Biblical legend of the flood visited upon man for his sins, and the boat of Rata, also a well-known personage in Polynesian folklore, closely resembles Noah's ark. The Tuamotu text might well have been influenced by the Bible, which the missionaries so zealously spread throughout almost all Oceania. The French scholar Cailleux, however, who recorded the text on Hao Island, says in his book on Polynesia that he heard very similar legends on other islands of the Tuamotu Archipelago. The legends, according to the local inhabitants, were very old and had been recounted by their forefathers before the arrival of Europeans. Cailleux notes that the Hao Atoll legend and other legends of the flood contain many archaic words that the natives no longer understand.

Probably the most acceptable explanation is that the islanders did have some old legends about a great flood. When the priests, who formed

an exclusive caste on the Tuamotu Islands and other islands of Polynesia, were introduced to Christianity they incorporated the Biblical myth into their legends. The purpose was to show the islanders that since the Bible and the ancestral legends dealt with the same subject the missionaries were merely confirming the legends.

Did a Polynesian continent, or separate islands, which sank, ever exist? There is an enormous shallow region in the neighbourhood of the Tokelau Islands that obviously must have been dry land at one time. The Tuamotu coral archipelago is actually only a "cap" on top of the great Tuamotu Ridge. Many peaks of this ridge were once above water. The guyots near the Tubuai Islands and the Tuamotu Archipelago also indicate the existence of dry land at one time. Although some of the guyots lie at depths of up to one kilometre, they were once at sea level. From the top of one of the guyots of the Tuamotu Ridge, now submerged to 1,000 metres below sea level, oceanographers have brought up fragments of coral reefs. Yet corals cannot live at a depth of more than 60 metres! At one time corals evidently made an unsuccessful attempt to found a colony there. The innumerable coral reefs, atolls and islets in the Tuamotu Archipelago are eloquent evidence of successful attempts.

The only fundamental disagreement between the old Polynesian legends and oceanographic findings is on the question of *when*. The legends claim that the land sank quickly and in human times. But this does not fit into the framework of marine geology, which regards a millennium and even one hundred millennia, as merely a tiny segment of time.

Comparatively recently oceanographer Cron-

well reported that coal had been found on the islet of Rapa Iti (Little Rapa, as the Polynesians call it to distinguish it from Rapa Nui, or Big Rapa, Easter Island, from which people had probably migrated to Rapa Iti), in the South-East Pacific. This is another sign there was once a continent in this part of the Pacific. A study of the island's flora has also shown that it could have developed only in contact with a continent, or that it is the remnants of continental flora. From this Cronwell concluded that a large land mass, now submerged, once existed in the Polynesian area and to the south of it.

Judging by the latest oceanographic and geological findings, the greater part of the hypothetical Polynesian continent, the volcanic islands and the coral atolls, both those that now exist and those that have disappeared, developed between 60 million and 100 million years ago. That is a tremendous span of time, quite incommensurate with the spans of human history. It has been estimated that man first appeared in Polynesia 4,000 to 6,000 years ago at the earliest. But even these figures are exaggerated, for the earliest known traces of man on the Marquesas Islands and the Samoa Islands are shown by the carbon dating method to go back only to the 2nd century B.C. It is quite possible that earlier human traces will be found in Polynesia in future, but it is unlikely they will be older than 3,000 to 4,000 years. The last big changes in our planet took place between 10,000 and 12,000 years ago, after the glacial epoch ended. At that time the Polynesian islands were uninhabited, and the Polynesians themselves did not yet exist as a cultural and language community. This community took shape no more than 4,000 years ago.

Yet the periods of time with which geology deals are measured in millions and *tens of millions of years!*

Can the enormous time gap between geological time and historical time be bridged to any extent? Underwater exploration in the Polynesian area should answer this question. If traces of human habitation are discovered on the Pacific floor in that area it will mean that Polynesian myths are based on fact. If no traces are found it will mean that the amazing concurrence between oceanographic findings and the mythology of the islanders is purely accidental. Instead of rushing to draw conclusions let us wait and see what underwater archeology tells us.

One place in the Pacific where underwater archeological surveys would undoubtedly produce interesting results is the offshore area of Pitcairn, an isolated little island in the East Pacific that is inhabited by descendants of the *Bounty* mutineers.

There is no need to retell the dramatic story of the mutiny on the *Bounty* and the discovery of Pitcairn Island. The point is that when the mutineers landed on Pitcairn they found it deserted, although breadfruit trees and the remains of ancient temples clearly showed the island had once been inhabited. In the largest temple, on a cliff, were stone statues which, like the famous giants of Easter Island, stood with their backs to the sea. The mutineers took a dislike to the "pagan idols", and threw them into the ocean. They set fire to and then sank the *Bounty* to prevent anyone from yielding to the temptation to flee the little island.

One hundred and fifty years later scuba divers came to Pitcairn Island. The very first day's

diving in the bay where the *Bounty* was sunk yielded a rudder bolt. This find was made so quickly because a Pitcairn inhabitant had found the rudder itself in that place in 1933. Nothing more was found until the end of the sixth week of underwater exploration, when the grave of the *Bounty* was discovered.

If future exploration brings to light stone statues at the bottom of the ocean, scholars will be able to solve yet another riddle of the Pacific, for stone statues were made on the Marquesas Islands, on Raivavai Island and on Pitcairn Island, as well as on Easter Island. A comparison of the style of the Pitcairn images with the style of the statues on Easter Island and other East Polynesian islands will help to explain how and where stone-carving, an art that is practically unknown to other inhabitants of Oceania, originated.

A Hawaiian Continent?

Almost all the Polynesian legends, including the myth of the deluge, mention the land of Hawaiiki either as a "land of the deceased", where the souls of the dead go, or as the "land of ancestors", the parent land of the Polynesians. That a parent land existed scholars do not doubt. The astonishing similarity of the languages, mythology and customs of islanders living many hundreds and even thousands of kilometres apart indicate that the remote ancestors of the present inhabitants of the Marquesas Archipelago, Tuamotu, Tahiti, New Zealand and other islands of Polynesia once all dwelt in the same place, where the Polynesian or, rather, the proto-Polynesian culture developed.

Where was the legendary land of Hawaiiiki located? There are many assumptions, but at the present time only one thing is certain—that the Hawaiian Archipelago is not the parent land of the Polynesians, no matter how tempting the idea may be. True, the name of the archipelago is a dialect form of the word "Hawaiiiki". But many places in Polynesia have similar names, for instance, Savaii, the chief island in the Samoan group, which is also a dialectical form of the word "Hawaiiiki".

Proto-Polynesian culture and language developed in remote antiquity, somewhere in the second millennium B.C. The Hawaiians appeared on their islands only in the second millennium A.D., according to their genealogy. Linguistic findings confirm this. The Hawaiian language separated from the main trunk of Polynesian languages about 1,000 years ago. Still, there is much that is vague about the origin of the Hawaiian people.

Archeological excavations have shown that people settled Hawaii at the beginning of our era. In other words, the ancestors of the present Hawaiians were preceded by another, more ancient people. Who were they? Archeologists cannot give a precise answer as yet. Hawaiian folklore describes in detail the oldest dwellers in the "land of eternal spring" as the Hawaiian Islands are sometimes called because the annual average temperature there fluctuates between $+20^{\circ}$ and $+22^{\circ}\text{C}$.

According to a legend which has come down by word of mouth "from innumerable generations", a vast land covered a large part of the Pacific Ocean. It was called Ka Houpo o Kanne, which means "Solar Plexus of Kanne". (Kanne was the

Hawaiian form of the word Tanne, one of the main Polynesian gods.) This land was destroyed by a great flood. All the inhabitants were drowned except three groups of people, the dwarflike Menehune, the Kenamu and the Kenawa. Later the Menehune completed the job started by the flood—they killed off all the Kenamu and Kenawa. The Menehune were the first people to live on the Hawaiian Islands. The ancestors of the present-day Hawaiians arrived on the islands later. To prevent intermingling with the newcomers the ruler of the Menehune ordered his people to withdraw into the forests on Kauai Island.

Other Hawaiian legends describe in detail the appearance and customs of the Menehune, stressing that now they live on Kauai. The legends disagree on one point: some say the Menehune were about one metre high, while others insist they were tiny creatures, the size of a human finger. Once there were more than half a million Menehune, but their numbers gradually decreased. Under the last independent Kauai ruler (who came under the sway of King Kamehameha I, ruler of the entire Hawaiian Archipelago) there were only 10,000 Menehune left. Afterwards they disappeared completely, although old people on Kauai claim that their grandparents occasionally met those tiny human beings.

Who were the Menehune? Were they just fairy-tale personages, like the European gnomes or the Abkhazian dwarf *atsans*, as Katherine Luomala, the world's leading authority on Polynesian folklore, believes? Or were they Polynesians who may be considered to have been the first mariners to cross the Pacific to the Hawaiian

Islands, and who were later turned into fairy-tale personages, as Hiroa Te Rangi, expert on ancient Polynesian culture, maintains? Or were the Menehune not Polynesians but the dark-skinned inhabitants of Melanesia or Micronesia? Or members of pygmy tribes, which are found not only in Africa but also on some islands of Oceania? We have no answers to these questions. Besides, a detailed discussion of them does not come within the terms of reference of this book.

What interests us is whether the legend of a deluge has any basis in fact. It is quite possible that the story of the destruction of a vast continent that united all of Polynesia, from the Hawaiian Islands to New Zealand and the Fiji Islands, is an exaggeration. But did land submerge in the vicinity of the Hawaiian Islands? If so, could it have happened in human times?

Oceanographers believe that land did subside there. Moreover, there is evidence of an opposite process, the rise of the ocean floor. Actually, the Hawaiian Archipelago was formed by the action of gigantic submarine volcanoes. Volcanism is still going on there. The largest volcano in the world is situated on Hawaii, the main island of the group. If we were to measure the height of Mauna Loa or "Long Mountain" not from sea level (where it is four kilometres) but from the ocean floor, on which its base stands, the height is about 10 kilometres, which would make Mauna Loa more than 1,000 metres higher than Mount Everest, the highest mountain in the world.

Coral reefs, as we know, grow only at moderate depths. Hence the thickness of a coral island

indicates the depth to which the undersea mountain or shoals on which the corals build their colony has sunk. On the Hawaiian Islands, coral remains are found in the mountains as well as in the ocean. On Kauai they have been discovered at a height of 1,220 metres, which means land rose there by almost 1,500 metres.

Considerable subsidence of land has also occurred in the vicinity of the Hawaiian Islands. Corals were found at a depth of 353,4 metres when soil from artesian wells near Honolulu, capital of Hawaii, was tested. This shows that the ocean floor there dropped by at least 300 metres. The valleys of Hawaiian rivers continue out into the ocean. Wells bored on Oahu Island have shown that river deposits here can be traced to a depth of 300 metres below the level of the Pacific Ocean. Twenty kilometres south-west of Honolulu, oceanographers have brought fragments of coral and shallow-water mollusks up from a depth of more than half a kilometre. This indicates that Oahu Island, on which Honolulu is situated, has subsided by at least 500 metres.

The most characteristic feature of the Hawaiian Archipelago is that its foothills slant inland instead of towards the ocean. This, say modern oceanographers, may be explained by a general intensive subsidence in this region. The Hawaiian Islands lie on the slope of a rise in the oceanic bed, as though they had arisen out of an embryonic mountain ridge. It is possible, say the experts, that the islands appeared as the result of the formation of an underwater ridge.

Indeed, the Hawaiian Archipelago is only the highest part of the giant Hawaiian Ridge, a vast mountain system hidden beneath the

Pacific. This ridge is 1,100 kilometres wide and from five to eight kilometres high. Its highest point is the Mauna Loa volcano, 10 kilometres high measured from the ocean bed. The northern section of the underwater ridge is level and is covered with smooth pebbles, a sure sign of shallow water. The claim that glaciers carried the pebbles to the ridge is not convincing since this area was not affected by the Ice Age. Besides, only waves could have levelled the tops of the mountains. In other words, there was a time when not only the Hawaiian Islands but other parts of the Hawaiian Ridge lifted their summits above the surface of the water. This must have been a very long time ago. Underwater research will show whether the land in the Hawaiian area sank at a time when the islands were inhabited. It is quite possible that some colossal tsunami may have given rise to the deluge legends, for the Hawaiian Islands have suffered time and again from these great ocean waves that carry death and destruction.

The history of the Hawaiian Ridge and other underwater ridges and mountains that stretch across the ocean to the shores of Asia is interesting not only because it gives us a clue to the origin of the Hawaiian people but also because it may help to answer the question of how Oceania was peopled.

Writing in the magazine *Okeanologia* about the 34th voyage of the research ship *Vityaz*, V. G. Kort, Soviet oceanographer, tells how the expedition discovered several new volcanic underwater mountains that once were islands and then sank. Discovery of these mountains, he says, supplements the data on distribution of volcanism in the Pacific and confirms the existence in the

past of island bridges connecting the continents lying on the surface of the ocean.

The interesting question is: did men use those bridges?

Guyot Land? Micronesia Land?

In his fascinating book *Vikings of the Sunrise* Hiroa Te Rangi, the well-known expert on Polynesian culture, calls the Polynesians the greatest navigators the world has ever known. Perhaps. One cannot but admire the Stone Age men who explored the vast expanses of the world's largest ocean in their fragile boats. The Pacific islands were explored, Hiroa Te Rangi believes, by well-organised expeditions that set out on voyages lasting many months. Navigational skills enabled the Polynesians to find their way across great distances to the remote islands and island groups that were their goal.

Te Rangi Hiroa's book first appeared in 1938. Some 20 years later the New Zealand historian Andrew Sharp published a monograph on ancient voyages in the Pacific in which he questioned the high opinion of Polynesian navigational skills held by Hiroa Te Rangi, himself half-Polynesian. Sharp maintains that if contacts among the Polynesian islands were so extensive many centuries ago they should all now have the same cultivated plants and domestic animals, for, what with the scanty fauna and flora, these are vitally needed. Yet they do not have the same ones.

Chickens, pigs and dogs are the typical oceanic trio of domestic animals. (The Polynesians, like other peoples in South-East Asia, use dogs as food.) Yet there were no dogs on the Marquesas

Islands and no pigs in New Zealand or on the Cook Islands. And all Easter Island had was chickens. Sweet potatoes, which the Polynesians call *kumara*, the staple food of the islanders, were not grown by the inhabitants of Samoa or the Cook Islands. There are a large number of similar examples.

Cultural differences were still greater. Only Easter Island had a written language. Only the Maori in New Zealand used curvilinear ornamentation, and so on and so forth. Surely this signifies that contacts among the Polynesians were irregular and accidental.

Polynesia, Sharp maintained, consisted of many insular worlds, all inaccessible, that could have been discovered only in the course of accidental migrations.

Many experts on Polynesian culture and historians of geographical discoveries found the scepticism of the New Zealand historian groundless. We shall not dwell on the stormy debates that raged round Sharp's monograph but merely note that Professor Nikolai Zubov, the Soviet oceanographer, put forward still another hypothesis of how many of the Polynesian islands were peopled. According to this hypothesis, which I mentioned earlier, the islands were not settled through well-planned expeditions, as Hiroa Te Rangi believed, or as a result of chance discoveries, as Sharp thought, but by way of island stepping-stones that now lie on the floor of the Pacific.

Today oceanographers and marine geologists consider it a proven fact that a chain of small islands once stretched from Micronesia to the Hawaiian Archipelago. Only two, Marcus Island and Wake Island, are on the map today, and they

owe their existence to the indefatigable coral builders.

When did this underwater land, which could rightly be named Guyot Land, since we learned of its existence thanks to the guyots, sink out of sight? It is natural that the deeper the mountains lie below the surface the greater the length of time since they subsided. A study of fragments of ancient coral brought up from two guyots has established that the guyots were islands about 100 million years ago. At this time, says Menard, many volcanoes in that area rose to the surface through four kilometres of water in the form of large islands.

Geologists were astonished to find the islands so young. But if 100 million years is a brief span to the geologist, it is an eternity to the historian, for the anthropoid ape had not yet appeared on the scene 100 million years ago, to say nothing of man. The *oldest islands* of this hypothetical undersea Guyot Land are 100 million years old, but other land areas there may have sunk much later, perhaps even after man appeared and began exploring the Pacific.

Only further study will tell us when the last islands and islets were submerged. Some lucky explorer may bring up from the tops of guyots not only reef fragments and smooth pebbles but also objects made by human hands. That will confirm Zubov's hypothesis that the remains of Guyot Land were drowned in human times and that they were stepping-stones in the peopling of a number of Pacific islands.

Guyot Land links up the Hawaiian Islands, which are the visible part of the vast Hawaiian Ridge, with the islands of Micronesia, likewise the peaks of an extensive undersea country.

Did the islands and mountains drown after Micronesia was inhabited?

Many scholars, beginning with Macmillan Brown, are inclined to believe that a large tract of land, whose inhabitants created a high civilisation, existed in the region of the Caroline Islands (the abovewater section of the vast Caroline Plateau). Evidence of the civilisation are the monumental structures that have been discovered on many islands of the Caroline Archipelago, a unique type of writing on the islet of Woleai, and the great stone ruins of Nan Matol on the island of Ponape, sometimes called the "Venice of the Pacific".

We mentioned the cyclopean structures on Ponape earlier in connection with Macmillan Brown's hypothesis of a lost Pacific continent, whose capital he thought Ponape was. The script of the inhabitants of Woleai is no less interesting. In 1913, the year Brown visited it, the island had a population of only 600, and its people waged a constant and difficult struggle for existence. At that time only five inhabitants had any knowledge of the script.

Could the script have appeared after the inhabitants were introduced to European writing, as in a number of cases in North America and Africa? But since it does not resemble any European alphabet or drawings of articles of commerce, Brown concluded that the Woleai script was the remains of a written language once widespread throughout the Pacific continent. Only time can tell whether the British ethnographer was right. American archeologists have begun digging on Ponape, but there is the possibility that underwater archeology will provide the key to the "Pacific Venice" mystery.

The Caroline Archipelago may have once been much more densely populated and have had many more islands than today. For, says Professor Klenova of the Soviet Union in her *Marine Geology*, science "knows of cases where coral islands have completely disappeared, such as the two islets in the Caroline group which vanished during a storm and turned into reefs. Ruins of structures and the remains of trees have been found underwater, on top of reefs. Almost every strong gale makes changes in the shape and number of coral islands."

A large number of coral islands in the Western Pacific, in a hypothetical archipelago which we might call Micronesia Land, could have vanished during a severe gale in the area of the Caroline Islands, where storms are frequent. The famous Russian traveller and anthropologist Nikolai Miklukho-Maklai recorded a Micronesian legend that many dwellers of Yap Island had come there from another island which had sunk. He noted that maps show a reef north of Yap which could have been the legendary sunken island.

On Ponape, where the Nan Matol ruins stand, legends about the earliest inhabitants of the island were recorded at the end of the last century. These were, say the legends, tiny men called Chokals. Not only were they much shorter than the Micronesians but they had low foreheads, broad noses and short curly hair. Ethnographers have recorded similar legends on the Marshall Islands.

Who were the mysterious Chokals? Personages in local fairy-tales? But such tales are always based on reality, no matter how fantastically they are presented. The description of the Chokals does correspond to the anthropological type of

the Negrito, a group of Negroid peoples of small stature living on the Malay Peninsula and on Luzon Island in the Philippines. The Negritos have absolutely no navigational skills. Does this not indicate that they reached Micronesia by land, land that is now at the bottom of the ocean? True, we have no evidence other than folk tales that the Caroline and Marshall islands were inhabited by Negritos in remote antiquity. But they live in the Philippines, and those islands also lie hundreds of kilometres from the mainland.

The Sinking Coast of the Pacific

Geologically speaking, the seas fringing the Asian continent—the Sea of Okhotsk, the Yellow Sea, the Sea of Japan, the Bering Sea and the Pacific—acquired their present contours only a short time ago. Land was subsiding and new volcanic islands and submarine mountains were rising out of the water there only 10,000 or 12,000 years ago. It is quite possible that the first men to reach Japan arrived there by land, not by sea.

“Language archeology” tells us that the Japanese language consists of two layers, as it were. The oldest layer indicates a kinship with the languages of the Asian continent. (Like the languages of the Koreans, Tunguses, Turks and Manchurians the Japanese language has a well-developed system of suffixes and postpositions.) The second layer points to links with the languages of Indonesia and Oceania. (In Japanese, as in most of the languages of Oceania, two consonants cannot stand side by side in a word.) Many

Japanese words are similar to Oceanic words. Since these usually denote things and concepts connected with the sea they may have been adopted during trade and cultural contacts. Communities of "maritime peoples" may have existed on the coasts of the Japanese islands, particularly the southern islands. But they were not the first men to settle in the Land of the Rising Sun. Archeologists have shown that Japan's oldest civilisation was a land-based culture, known as the "jomon". Anthropologists connect this civilisation with the Ainus, who once inhabited Sakhalin and the Kuril Islands as well as the Japanese Archipelago.

The Ainus were for a long time a major mystery to anthropologists, who placed them in all three of the big races, the European, Mongoloid and Negroid. Soviet scholars have put forward impressive evidence that the Ainus were related to the aborigines of Australia and the other dark-skinned peoples forming the "Oceanic branch" of the big Negroid race. The Ainus are poor mariners. In all likelihood they came to Japan in remote antiquity, using now vanished islets and land areas as bridges. The early inhabitants must have witnessed the destruction of old islands and the birth of new islands in the Sea of Japan. South of Tokyo Bay there are several islands from two to ten kilometres in diameter which were formed by young volcanoes. Not long ago the remains of a man of the Neolithic Age were discovered on Oshima, the island closest to Tokyo. Several thousand years ago men roamed the slopes of a volcano. Then the central part of the volcano collapsed and formed a caldera, a crater, within which a new cone later grew. Man was witness to all these changes.

The Japanese islands were created, say geologists and oceanographers, by volcanic eruptions alternating with the rise and subsidence of the oceanic floor as a whole. The cataclysms that cause so much damage in Japan in our time are evidence that the earth's crust in this area is still intensely active. The submarine canyons, such as the canyon in Tokyo Bay which extends almost 20 kilometres, show that many of Japan's islands used to be much larger. A study of Japanese myths that go back into remote antiquity, plus underwater archeological research, will tell us to what extent the peopling of Japan and the rise of its prehistoric culture were connected with the unceasing activity of the earth's crust, with the subsidence of tracts of land and the birth of new islands in the sea.

China's oldest myths tell of a war between the god of fire and the god of water "at the beginning of the world". The mountains erupted fire, the earth quaked and the sea attacked the land. When the fire god was defeated he decided to commit suicide and struck his head against the highest mountain in the west. The frightful blow drove the land into the sea in the east like the prow of a boat, while in the west it flew into the air like a boat's stern. Since then all the rivers in China have flowed eastwards.

"Geological, geophysical, paleontological, archeological and anthropological studies have shown," says the Soviet scholar Yuri Reshetov, "that up until at least the middle of the last Ice Age the Japanese islands and Indonesia were Asian peninsulas. During the second half of the Ice Age (from 40,000 to 20,000 years ago), vast areas of land subsided into the sea and were replaced by what are the Sea of Japan and the

South China Sea. The sinking was accompanied by powerful volcanism and by earthquakes. At about the same time, that is, towards the end of the Ice Age, the ranges of Indo-China and the mountains of Central Asia rose another 2,000 metres. Many generations of Chinese must have witnessed the gigantic geological changes in South-East Asia. It is these events that the myths about the struggle between the gods of fire and water evidently reflect."

If Indonesia was a peninsula 20,000 years ago, its division into separate islands took place at a later period. On the Sunda shelf lying between Java and Borneo, on the one hand, and the Malay Peninsula, on the other, there are sunken river valleys at a shallow depth; they have a ramified system of tributaries, like the veins of a leaf. These submerged valleys resemble ordinary river systems. They are not the work of the tides. Therefore, we must conclude that land sank here not so long ago.

It was discovered in the nineteen twenties that the river valleys on Sumatra and other Indonesian islands continue into the shallow Sunda Sea, forming a completely submerged river system. This system of "underwater rivers" flows into the South China Sea, between the Great Natuna and South Natuna islands (Buruan Islands). The river valleys sank not so long ago, from the viewpoint of geology and oceanography. This took place well within human times, after man had settled his planet and reached a definite level of civilisation.

Some Indonesian islands are no more than a few thousand years old. Immense geological processes are still taking place there; they are among the "hottest" spots on earth. The monstrous eruption

of the Krakatoa volcano in the last century (the repercussions were felt 4,000 kilometres away!) is the best known but far from the only manifestation of volcanism in Indonesia, and perhaps not the strongest. Indonesia has 128 volcanoes, many of them still active.

A new volcano, named Tamboro, appeared on the Island of Sumbawa in 1812. Three years later, after the volcano had grown to 4,000 metres (!), it erupted, turning 100 cubic kilometres of rock into red-hot stones, dust, sand and ashes that buried almost 100,000 people, says the well-known French volcanologist Haroun Tazieff in his book *Le rendez-vous du diable*. The colossal explosion reduced the height of the volcano from 4,000 to 2,850 metres.

According to Tazieff, Bromo on Java is one of the most active and probably one of the most destructive volcanoes in the world. It steams constantly and erupts on an average of once in two years. The volcano in the middle of Java, Mt Merapi, meaning "place of fire", is among the greatest fire-breathing mountains on earth. The first recorded eruption of Merapi took place in the year 1006. The ashes covered a magnificent Buddhist temple, the Borobudur, and killed thousands of people.

Javanese chronicles tell the story of the disaster. But think of how many cataclysms took place before events were recorded in writing! And how much more grandiose were the processes that took place in the turbulent period we call the end of the last Ice Age!

The Island of Bali, situated next to Java, has the best preserved traces of an ancient culture that combines features of the local Indonesian civilisation with those of a civilisation brought

from India more than 2,000 years ago. According to local legends, Bali was once a flat, barren island. Then the gods abandoned neighbouring Java after the "faithless" appeared there, and moved to Bali. To make it into a place fit for themselves to live in, they created mountains on the island.

The mountains on Bali are indeed young. Volcanoes were active there in the past and are still active today. Do Bali legends go back to the remote time when the island really had no volcanoes? Or did the cataclysms give rise to the myth of the gods moving to Bali? The myth was propaganda, of course. The "faithless" were the Moslems who, in the Middle Ages, seized Java and many other Indonesian islands, supplanting Hinduism and the local pagan cults.

Folklorists may be able to answer this question, but they will probably need the help of geologists, oceanographers, and volcanologists. It is now clear that archeologists and anthropologists cannot study the ancient history of the peopling of the Indonesian archipelago without using data provided by other earth sciences. Man began to settle on these islands at a period so remote that by comparison the last Ice Age is a recent event. (The last Ice Age ended between 10,000 and 12,000 years ago, while man as we know him appeared all of 40,000 years ago.)

The earth sciences may clarify a problem which archeologists, philologists and ethnographers have been trying to solve for a good 150 years. The problem is: where did the Austronesian peoples inhabiting the islands and islets scattered throughout the Pacific Ocean, and the Indian Ocean as well, come from?

In the last century philologists discovered a remarkable similarity among the languages spoken over the vast area that extends from Madagascar, near the shores of Africa, to Easter Island in the eastern part of the Pacific. It has now been demonstrated that the similarity is not accidental. The languages spoken on Madagascar and on Easter Island which, along with those of the Hawaiians, Maoris and other inhabitants of Polynesia, belong to the Polynesian group, the languages of the Micronesians, living on islands in the North-West Pacific, those of the Melanesians, inhabiting islands in the South-West Pacific, the languages of the Indonesian Archipelago, and those of the indigenous population of Taiwan all come from a single root and constitute the Austronesian ("southern islands") family of languages. Where the Austronesian languages originated is not yet certain. Some scholars say New Guinea, some say South China, and some say India, but Indonesia seems to be the most likely place.

What drove the Austronesians to set out on distant voyages across two oceans: the Indian Ocean to Madagascar and the Pacific Ocean to Hawaii, New Zealand and Easter Island? It is impossible to say. But it would not be too bold to assume that it was the submersion of land in the area of Indonesia and the destruction of the hypothetical Austronesian Land. Just remember how young that region is geologically, as the gigantic eruption of Krakatoa so loudly proclaimed.

Sunda Land is what geologists call the paleogeographic land mass that once united the northern islands of the Indonesian Archipelago up to Bali, part of the Philippines and perhaps

Japan and Sakhalin. Its final destruction took place from 10,000 to 12,000 years ago.

Traces of man in Indonesia are much older than that. A skeleton 40,000 years old has been found on the Island of Borneo. It well may be, in fact, that this area was the cradle of the human race.

Exploration of the floor of the shallow seas and straits of Indonesia may be able to tell us how the subsidence of land and the birth of new islands in Indonesia affected the destiny of man from the period of *Pithecanthropus* to the dispersion of the Austronesians.

Australia and Tasmania Land

Sunda Land, which once connected the Indonesian islands with the Asian continent, was not the only paleogeographic land mass in that part of the world. To the south lay another continent, Sahul, of which New Guinea, Australia and Tasmania are the unsubmerged portions. These two continents were connected 50 million years ago by a land bridge which later sank beneath the water. The boundary line between Sunda Land and Sahul, or between the Oriental and Australian regions, was established by Darwin's associate Alfred Wallace. Although Wallace was not an oceanographer or a geologist, both oceanographers and geologists agree with him.

Investigating the geographical distribution of animals in South-East Asia, Wallace found that the eastern boundary ran between the islands of Bali and Lombok, then across the Makassar Strait between Borneo and Celebes, skirting the Philippines from the west and north-west. Asian

animals did not go beyond that boundary (known with perfect justice as Wallace's line), for their way was barred by a narrow belt of sea. "Wallace's line" is the boundary between the Oriental and the Australian regions.

This water barrier proved insurmountable to land animals. What about man? The answer to this question helps to clarify a problem that was debated for more than 150 years, namely, how Australia, the fifth continent, was peopled. When Europeans discovered Australia they found that the aborigines there had no navigational skills. Neither, evidently, had their forefathers. How, then, had the latter reached Australia, cut off as it is from the rest of the world? Or had they lived there since time immemorial, since the rise of *Homo sapiens*?

A member of the great Russian Antarctic expedition of 1819-21, Ivan Simonov, suggested that the Australian aborigines were descendants of people who had come from India, members of the lowest castes. Robert Fitzroy, in command of the famous *Beagle*, advanced the hypothesis that the Australians were descendants of Africans. According to a third hypothesis, the Australian aborigines were the original *Homo sapiens*, and it was from Australia that man moved out to settle the rest of the world. Today all three hypotheses possess only historical interest. Most modern scholars consider it as proved that man originally came to Australia from South-East Asia. The direct ancestors of the Australian aborigines developed on the territory of Sunda Land in the last Ice Age. This is shown by the similarity between the oldest skulls unearthed on Java and Borneo and in Indo-China, and the oldest skulls found in Australia, and also by the

fact that stone implements discovered in Indonesia are fashioned in the style and traditions of the most archaic stone implements of Australia.

Excavations reveal that people were living in Southeastern Australia 18,000 years ago. Since migration was from the north, from South-East Asia and Sunda, the first men must have reached Australia at least 20,000 years ago. It was not Australia as we know it, but Sahul Land, which disintegrated into New Guinea, Australia and Tasmania 10,000 years ago, at the end of the glacial epoch.

"The peopling of Australia was a long and haphazard process," writes V. Kabo, a Soviet expert on Australia. "The first small groups of proto-Australoids made their way across New Guinea and directly across the coastal regions, now vanished, of Sahul Land. Gradually increasing in numbers as they spread southwards, they set foot on the land of present-day Australia somewhere near the Cape York peninsula." Kabo believes that "the peopling of Australia started from the northern coast of Sahul Land, which is now under water. This means that the oldest traces of man's presence there are buried beneath water."

Underwater archeology thus has another fascinating job—a search for traces of the first inhabitants of Australia at the bottom of the straits along which Wallace's line runs, on the floor of the Torres Strait, separating New Guinea from Australia, and on the floor of the shallow Timor Sea, between the Island of Timor and Australia, where the water is no deeper than 42 metres.

The latest oceanographic and geological find-

ings show that during the last Ice Age the ocean level was 110 metres lower than it is today. If it were 45 metres lower than today there would be solid land from the Malay Peninsula to Bali and the Island of Palawan in the Philippines. If the ocean level were only 18 metres lower than it is today there would be a bridge of land between New Guinea and Australia in the region of the Torres Strait. Such a land bridge did exist, and it vanished, says Australian oceanographer Jennings, only 7,000 or 8,000 years ago.

In his monograph *The Origin and Early History of the Australian Aborigines*, Kabo writes: "The last maximum of the Wurm glaciation in both hemispheres took place from 20,000 to 27,000 years ago, says Zeuner. Hence, the beginning of the glaciation almost coincides with the period during which, according to our data, man came to Australia. But some of the straits still existed at that time. Using their primitive rafts or logs, people crossed one strait after another and gradually reached Sahul Land across Java, they went across the Lesser Sunda Islands and Timor Island into Northwestern and Northern Australia, or across Sulawesi (Celebes), the Tenimbar Islands, the Aru Islands, Ceram Island, Halmahera Island and New Guinea into Northern and Northeastern Australia. This slow and haphazard process may have lasted thousands of years."

Primitive man accomplished what the tigers, orangutans and other animals of South-East Asia had been unable to do. On rafts and logs he crossed the narrow straits separating Sunda from Sahul and stepped onto Australian soil. When the glacial period ended and the level of

the ocean rose, many islands and land bridges vanished beneath the waves, and the Australians were completely isolated from the rest of the world until European seafarers discovered them 10,000 or 12,000 years later.

The "Australian riddle" has thus been solved through the co-operation of anthropology, zoogeography, geography, archeology and geology. Perhaps these sciences will help us to find the key to another, still more mysterious riddle of ancient history—the origin of the indigenous inhabitants of Tasmania.

If we go by their stone tools, the Tasmanians were the most backward people in the world. While the Australians were in the Middle Stone Age, the Mesolithic period, the tools used by the Tasmanians were amazingly like those which men of the Early Stone Age used in the Old World some 40,000 or even 60,000 years ago! Stone implements are, unfortunately, our only reliable source in studying the culture of Tasmania. One of the most disgraceful wars in the history of European civilisation savagely destroyed the Tasmanians. There were only 11 Tasmanians alive in 1860, and the last pure-blooded Tasmanian, a woman, died in 1876.

How did the original inhabitants reach Tasmania? In the recent geological past there was a chain of islets in the shallow Bass Strait that separates Tasmania from the continent of Australia. These stepping-stones made it easy to get from the continent to the island. The southeastern part of Australia was already inhabited 180 centuries ago, when the level of the seas was much lower and people could have crossed the Bass Strait, practically, without getting their feet wet. If the level were only 54 metres lower—and

at that time it was all of 110 metres lower than today—Tasmania would be united with Australia. A fall in sea level by 45 metres would connect Australia with Tasmania by a chain of islets situated close to one another. It is logical to assume that when the first inhabitants of Australia reached the southern tip of the continent they continued on farther into Tasmania. Yet the now extinct Tasmanians had almost nothing in common with the Australian aborigines. They differed from the Australians in appearance, language and cultural level.

A number of scholars have suggested that the first inhabitants of Australia were what they call proto-Tasmanians. Later, another group of tribes, the proto-Australians, came to Australia and began to oust the first settlers, finally driving them to Tasmania. But if this was the case, why didn't the Australians follow them? And why have not archeologists been able to find traces of proto-Tasmanians anywhere on the Australian continent? All the finds made in Australia, no matter how far back they date, have a direct connection with today's aborigines and their culture. This indicates that there were never any proto-Tasmanians in Australia. A people that inhabited a whole continent could not have disappeared without a trace.

What is really astonishing, though, is that in appearance and in some features of their culture the Tasmanians resembled the inhabitants of New Caledonia, the most southern of all the islands of Melanesia, a good distance away.

The resemblance was noted as far back as in 1847. One hundred years later the eminent Soviet archeologist and ethnographer S. Tolstov suggest-

ed that when Southern Melanesia was first populated a Negroid group was carried to the coast of Tasmania by the powerful East Australian Current that runs from New Caledonia to the shores of Tasmania and then turns towards New Zealand's South Island. This group, finding itself on a big continent-like island rich in life-supporting resources, lost a number of features of the culture which they had developed as seafaring fishermen. The abrupt change in natural conditions, leading to changes in occupations, might have resulted in a considerable overall cultural decline.

Yet could there have been such significant degradation that the Tasmanians, if they were descendants of the New Caledonians, lost all navigational skills (the Tasmanians did not even have the most primitive boats!) and sank back from the Late Stone Age in which the Melanesians lived into the Early Stone Age? History does not know of any cases of this kind, and they are extremely unlikely. And so, the origin of the Tasmanians still remains a mystery. Perhaps the same key that will help to solve the riddle of the peopling of Australia will help to unravel the Tasmanian puzzle.

In a fairly recent article Australian oceanographer R. W. Fairbridge has put forward evidence to the effect that the South-West Pacific may be divided into two provinces, the remains of two large land masses, Tasmania Land and Melanesia Land. In the Tasman Sea oceanographers have discovered guyots whose summits were once above the surface. The land here may have sunk in human times. The ancestors of the Tasmanians, related to the dark-skinned inhabitants of the Melanesian islands, may have made

their way to Tasmania along chains of islands that have since drowned.

They may have reached New Zealand as well. A legend about the Polynesian discovery of New Zealand says that it was inhabited by people of tall stature with flat noses and a dark skin, the very features which distinguish the Melanesians from the Polynesians. The "Black Maori" or Mariori, (a people who, like the Tasmanians, has been completely wiped out) lived on the Chatham Islands east of New Zealand until the Europeans arrived. Archeologists have found traces in the soil of New Zealand of an ancient primitive culture that differed from the Polynesian. It is known as the "moa hunters' culture", for the chief bird hunted by the original settlers was the gigantic running bird called the moa.

All the archeologists, historians and philologists who study Oceania agree that the oldest inhabitants there belonged to the Negroid race. Were the oceanic islands settled thanks to land bridges that have now vanished? How far east could the first explorers have gone? When did the guyots in the Tasman Sea subside? When did the mountain chain that stretches from the southern part of Melanesia to New Zealand, and which now exists only as a wide area of shoals, disappear under the water? Was it along this ridge that the dark-skinned Melanesians made their way to New Zealand? It is up to underwater archeology to furnish the answers to these riddles of oceanography and ancient history.

Thomas Huxley and other scholars of the middle of the last century believed that the Tasmanians came to Tasmania from New Caledonia by land which later sank into the Pacific. Today,

oceanographers possess data showing that separate islands and perhaps even large land masses once existed in that region.

For example, Macquarie Island near Tasmania is only a small part of a vast underwater ridge. The mountains of New Zealand's South Island and the underwater Lord Howe Range are continuations of the ridge. The entire area, from small islets like Lord Howe or Macquarie to the two large islands constituting New Zealand and even adjoining sections of the oceans have a continental crust. It is very possible that this "semi-continent", partially under water and partly above water, is connected with other land sections and submarine ridges south of it, in Melanesia.

Melanesia Land

Melanesia Land is what scholars call the large continent assumed to have existed in the South-West Pacific until the middle of the Tertiary period. After that it began to sink and continued to sink until only recently. Evidences of this are the underwater ridge connecting New Guinea with the New Britain Island; traces of the subsidence of the sea floor in the area of the Solomon Islands and the Loyalty coral islands near New Caledonia; and New Caledonia itself, the visible part of a vast underwater ridge. The Fiji Islands, at the eastern edge of Melanesia, are the result of violent geological activity that continued into the Quaternary period; they alternately sank and rose high above the surface.

Geologically, Melanesia Land existed comparatively recently. Did it sink in the period

when man had begun to settle in Oceania? The science of philology provides us with a positive answer.

The more than 1,000 languages and dialects spoken in Oceania fall into two large groups. The first group, including the Polynesian, Micronesian and Melanesian languages, belongs to the great Austronesian family mentioned earlier. The second is called the Papuan group, although people of other islands besides the Papuans of New Guinea speak them.

The Austronesians invented the catamaran, a raft consisting of two or more logs lashed together, on which they voyaged over two oceans and spread from Madagascar to Easter Island. The invention was evidently made in Indonesia, the homeland of the Austronesians. It was adopted by some of the dark-skinned inhabitants of Melanesia, who also borrowed Austronesian languages in place of their Papuan languages. (There are other instances in history of similar borrowings.) But there are still places in Melanesia where non-Austronesian languages are spoken. Papuan languages are spoken not only on New Guinea, by the majority of the population, but also on the Admiralty and New Britain islands, New Ireland Island, the Solomon Islands and New Caledonia. Papuan languages may have existed on the Fiji Islands as well; some features of the Fiji tongue indicate this, although it is a Melanesian language.

How the Austronesians, the greatest seafarers of antiquity, reached the Oceanic islands is clear. But how did people who spoke the Papuan languages reach those islands? According to Professor Hans Damm, an authority on the Melanesian culture, the Papuans knew little about

navigation, which makes them essentially different from the Melanesians, Polynesians and Micronesians. They moved up and down the big rivers of New Guinea in narrow dugout canoes which they never dared to take out to sea, and would have been foolhardy to do so. The Papuans, says Professor Damm, are typically land dwellers. How, then, did they manage to reach Oceanic islands as much as hundreds of kilometres away? Perhaps in the same way as the ancestors of the Australians migrated to the fifth continent.

Prehistoric man came to Australia long before the end of the last Ice Age, by way of New Guinea, but from there he could also have continued eastwards, to the Melanesian islands. Since there were numerous islands and islets that later sank in the coastal waters washing the islands of Melanesia, or rather, Melanesia Land, it was much easier for the Papuan-speaking tribes to people the Oceanic islands than it was for the Austronesians who voyaged eastwards several thousand years later. On their superb catamarans the Austronesians travelled far out into the Pacific. Moving eastwards much earlier than the Austronesians, the Papuan-speaking peoples were able to spread out over the ocean thanks to land bridges and islands and islets that have since disappeared.

It is highly probable that the peopling of Oceania began very long ago. If man appeared in Australia 20,000 years ago he must have reached New Guinea still earlier. People speaking Austronesian languages came to the New Guinea area 5,000 to 6,000 years ago, says Soviet ethnographer N. Butinov. On the Fiji Islands archeologists have found traces of man that go back 4,000 years, but these are traces

of Austronesians, who were not the original settlers.

We have mentioned the Negritos, dark-skinned pygmies who live in the jungles of the Malay Peninsula and the mountains of Luzon in the Philippines. Tribes of Negritos also live on New Guinea. They have no idea of navigation and could have reached the island only by land. True, New Guinea does not lie far from other islands. But small, dark people also live on the New Hebrides, which are farther away. They must have reached those islands in the same way the other pygmy tribes reached New Guinea, that is, across now vanished islands and land bridges.

It is quite possible that the Negritos settled on the Solomons too, for legends recorded on those islands speak of undersized people with a dark skin. Similar legends are found among the Fijians, and archeologists have discovered extremely primitive tools on the Fiji Islands that could not have belonged to Austronesians.

Linguistic data are thus confirmed by the data of other sciences dealing with man—anthropology, ethnography, archeology and folklore. Are they confirmed by oceanography and geology, sciences dealing with nature? Only a thorough investigation of the floor of the South-West Pacific and of the numerous internal seas washing the islands and archipelagoes of Melanesia will tell us that. These seas have been hardly investigated at all either by underwater archeologists or by oceanographers, who are just beginning to probe that unusually complex region.

Modern anthropologists have shown that there is no Oceanic race as such, that all the inhabitants of Oceania belong either to the Mongoloid race or to the Negroid (Equatorial) race. Negroids

live for the most part in Africa. There are also Negroids in southern India. The Australians and other "Oceanic Negroids" are separated from the Africans and dark-skinned Indians by the Indian Ocean. And the Indian Ocean will perhaps some day explain why members of the Negroid race have come to be so many thousands of kilometres apart.

Part Two

THE INDIAN OCEAN



Riddles of the Equatorial Race

Although the Solomon Islands in Melanesia and the African continent are thousands of miles apart, inhabitants of these two places look so much alike that even expert anthropologists have difficulty telling them apart.

The whole of tropical Africa is inhabited by the Negroid, or Equatorial, race. We also find members of this race far away at the other end of the Indian Ocean—on the Australian continent, in New Guinea, and in the jungles of the Malay Peninsula. How did they become so widely separated? Why is the earliest population of Madagascar Island closer to the Melanesians than to the inhabitants of the nearby east coast of Africa? And why does Malagasy, the language of the present-day inhabitants of Madagascar, have more kinship with the language of the inhabitants of Easter Island than with the languages of the African continent?

Why do the fauna and flora of Madagascar show Indian rather than African affinities? Why does every large subdivision of the Equatorial race include a dwarf branch? There are the pygmy tribes of Africa, the dark-skinned pygmy peoples of the Malay Peninsula and the Philippine Islands, the pygmy tribes in the mountainous regions of New Guinea and, finally, the tiny inhabitants of the Andaman Islands in the Indian Ocean, who are still in the Stone Age. Could these be the remnants of a once enormous dwarf branch that inhabited Africa, Southern Asia and Oceania?

The Negroids of Africa and Oceania are separated by the expanses of the Indian Ocean. The Asian continent, the vast land area between Africa and Oceania, is inhabited by members of

two other big races, the European and the Mongoloid. True, there are some Equatorial pockets here. In central India there are the Munda, Negroid tribes that are among the country's earliest inhabitants, and in Southern India there are the dark-skinned Dravidians, whose origin is a mystery to science.

The greatest controversy, however, centres round the Tamils, a Dravidian people with a distinctive culture. Scholars have named various countries, and even continents, as the original home of the Tamils. The Tamils themselves, or their historians, to be more exact, believed that in the remote past the Tamil homeland was situated in the southern part of Nawalam, a large island that was one of the first land masses to arise near the equator, and that Lemuria, a lost continent considered to be the cradle of civilisation, was part of the same region.

Tamil scholars believed Lemuria to be the northern projection of Gondwana, a vast continent now lying at the bottom of the Indian Ocean.

Other Indian legends speak of Ruta and Daitia, countries that also sank into the ocean.

Geologists have advanced a hypothesis that a great land bridge once connected India and Africa. The long, steep projection of the Eastern and Western Ghats, the mountain ranges that separate India from the ocean, suggests that land subsidence on a vast scale once took place here. Volcanic lava reaches down into the ocean to a depth of nearly one kilometre. It is possible that the sea floor was once land, and the Ghats arose when this land sank to the bottom of the Indian Ocean to the west of the mountains. Many geologists are of the opinion that the whole of the Indian subcontinent is a vast, flat chunk of

land left over from a land mass whose western part sank into the ocean, while the Island of Ceylon, in its turn, is part of the subcontinent.

In the Bombay area there is a submerged forest. Furthermore, the very appearance of the coast is weighty evidence, geologists say, in favour of the theory that land there sank below the waves not long ago. Traces of land subsidence are also found along both the eastern and western coasts of Southern India.

Many geographers of antiquity, the famous Ptolemy among them, believed the Indian Ocean to be a huge lake, surrounded by land on all sides. Do the land areas depicted on ancient maps now lie at the bottom of the Indian Ocean?

The dispersion of peoples throughout the world went on for thousands of years, perhaps even hundreds of thousands of years. Naturally, big geological changes, such as land subsidence or, on the contrary, land elevation, could have taken place in this time.

Perhaps the riddles of the dispersion of the Equatorial race can be logically explained if we assume that there was once a land bridge between India and Africa, and even between Africa and Australia. After all, modern geological data show that the entire coastline of South-East Asia is slowly sinking into the ocean. Perhaps this process of subsidence once proceeded much faster and on a much broader scale.

Gondwanaland and Lemuria

A large number of geologists believe that a great continent called Gondwanaland, comprising South America, Africa, India, Australia and Antarctica, existed in the Southern Hemisphere hundreds of millions of years ago.

When you compare the fossil fauna and flora of the various parts of Gondwanaland you find remarkable similarities. And not only in the fossils, for that matter. Warmth-loving earthworms of exactly the same species are found in the southwestern part of Australia, in India, and on Ceylon. Since the earthworms could not have crossed the Indian Ocean under their own power, either India and Australia were once connected by a land bridge, or else the two were once contiguous and then became separated by thousands of kilometres of ocean. There are members of lower mammalian orders, such as marsupials, or pouched mammals, which are found only in Australia and South America. This indicates that either the two continents were once parts of a single continent, or they were connected by a land bridge.

There is a great number of similar instances, and it is clear to geologists, zoologists and paleontologists that South America, Australia, India, Africa and also Antarctica were once parts of Gondwanaland. What is more, data furnished by these sciences shows that Gondwanaland began to break up between 150 and 180 million years ago, after having existed as a single continent for all of 3,000 million years. Still, many points in the history of this ancient continent or, rather, proto-continent, remain unclear. It is absolutely unknown, for one thing, whether the Indian Ocean—or at least some area of it—was part of Gondwanaland, or whether it was always a separate entity.

This brings us again to the old question of which type of crust, oceanic or continental, came first. The origin of Gondwanaland and the Indian Ocean has aroused even more heated debate

among geologists and oceanographers than the origin of the Pacific Ocean. The two schools of thought that have arisen centre around the hypothesis of continental drift.

It is customary to regard the distinguished German scientist Alfred Wegener, a geophysicist, astronomer, arctic explorer and meteorologist, as the originator of the hypothesis of continental drift. Similar ideas were put forward nearly half a century earlier by the Russian scholar Y. Bykhanov, but Wegener, a man of greater erudition with more up-to-date information, was able to present a much better argued and detailed exposition of the hypothesis.

Wegener's book *The Origin of Continents and Ocean Basins* aroused stormy debate, and the continental drift controversy still goes on today. According to Wegener, the entire land area of the world once formed a single continent. Later, lunar and solar gravitational pull and violent processes taking place deep inside the earth split this original continent into two proto-continents: Laurasia, including Europe, North America and the greater part of Asia, in the Northern Hemisphere, and Gondwanaland in the Southern Hemisphere. If you look at a map of the world you will see that the coastlines of the continents fit together amazingly, although the continents are separated by great expanses of water. The geological structures of the coastlines also have features in common.

For example, the Cape Mountains on the west coast of Africa have a twin on the east coast of South America with the same kind of rocks, the same minerals and the same sequence of strata. There are a great many such coincidences.

Many of Wegener's views were mistaken, for in his time geophysicists did not have the precise instruments they possess today. Besides, the structure of the ocean floor was practically unknown in those days (Wegener evolved his hypothesis before the First World War). Nevertheless, many scientists today share Wegener's main idea, namely, that not only do the continents move up and down the mantle which surrounds the earth's core but they also move laterally, or drift on it. Today, too, just as in Wegener's own time, far from all scientists agree with the hypothesis.

First, some categorically reject the possibility of a continental drift over great distances.

The similarity in continental contours that Wegener pointed out could be purely accidental, they say. Particularly since the contours were quite different in a not so very remote period, as is testified by the shallow continental shelf, which was above sea level during the last Ice Age and was flooded only after the ice melted. Similarities in the fauna, flora and geological structures of Australia, Antarctica, South America, Africa and India can, in their opinion, be explained by the simple fact that those continents were once connected by dry land that has since been submerged.

Supporters of Wegener's hypothesis picture Gondwanaland as combining the continents of the Southern Hemisphere. The continents drifted apart, and that was the end of Gondwanaland. Opponents of the continental drift theory, however, believe that the southern precontinent was much larger, that besides South America, Africa, India, Australia, Antarctica, Madagascar and Ceylon, it included part of the South Atlantic,

nearly the whole of the Indian Ocean, and even portions of the South Pacific.

Gondwanaland broke up over the course of millions of years. Land areas subsided, were covered with water, and became the floor of the ocean. Coral colonies appeared in the shallow waters and unobtrusively set about their titanic labours, with the result that in the Indian Ocean, as in the Pacific, there arose coral atolls and reefs, and the Maldivé, Laccadive, Cocos and Chagos islands.

Nevertheless, the existence of these islands cannot explain the resemblances between the fauna and flora of India and of Ceylon, Madagascar and Indian Ocean islands of the "continental" type, like the Seychelles and the Comoro, which are granite, not coral islands. This is what led the English zoologist Philip Sclater to advance the supposition, in the middle of the last century, that a large land mass, called Lemuria, continued to exist in the northwestern part of the Indian Ocean many millions of years after the break-up of Gondwanaland. Lemuria served as a bridge for the geographic dispersal of primeval fauna and flora. Sclater's hypothesis met with support from geologists, zoologists, botanists, oceanographers and paleontologists. Specialists in the brand-new science of the origin of man, paleoanthropology, gave Lemuria a key place in the emergence of man, believing that this was where the ape evolved into *Homo sapiens*.

The Cradle of *Homo Sapiens*

"Many hundreds of thousands of years ago, during an epoch, not yet definitely determinable, of that period of the earth's history known to

geologists as the Tertiary period, most likely towards the end of it, a particularly highly developed race of anthropoid apes lived somewhere in the tropical zone—probably on a great continent that has now sunk to the bottom of the Indian Ocean,” Frederick Engels wrote in his book *The Role Played by Labour in the Transition from Ape into Man*.

Engels based himself on the writings of Darwin, Huxley and other outstanding scientists of the 19th century who laid the foundations of modern natural history and the sciences dealing with man. Thomas Huxley, an associate of Darwin's who investigated the origin of man (Huxley is mentioned earlier in this book in connection with the origin of the Tasmanians) assumed that *Homo sapiens*, that is, man regarded as an organic species, arose on the now sunken continent of Lemuria. As we see from the lines quoted above, Huxley's view was shared by Frederick Engels, who closely followed the latest findings in all the sciences, from mathematics to paleoanthropology.

Huxley's hypothesis was developed by another great 19th century biologist, Ernst Haeckel. After a thorough study of the data which the science of the origin of man had accumulated by that time, Haeckel came to the conclusion that there was a missing link in the chain of evolution between the anthropoid ape and *Homo sapiens*. Haeckel named this hypothetical genus of primates *pithecanthropus*, or ape-man, who, he believed, had lived in Lemuria and migrated from there north-east to India and South-East Asia, and westwards to Africa.

Before long, Haeckel's theory received brilliant confirmation when Eugène Dubois, a Dutch anat-

omist, discovered the bones of a pithecanthropus on the Island of Java. Later, the bones of apemen were found in Africa and India.

All the above scientists enjoy prestige of the highest order, but their conclusions were arrived at on the basis of the facts available in the 19th century. Since then, geology, paleoanthropology, oceanography and zoology have accumulated hundreds of new facts; what is more, they possess instruments and devices about which scientists could never have dreamed in the last century. And so, how does modern science regard the problem of Lemuria and the origin of man?

In a recent monograph, *The Nature of the Earth and the Origin of Man*, the Soviet author Y. Reshetov convincingly shows, on the basis of the latest findings in geology, paleontology and paleoanthropology, that Lemuria, the eastern part of Gondwanaland, played a very important part in the development of early man. Reshetov believes that about 100 million years ago Lemuria apparently occupied the region of what is now the Mid-Indian Rise of the Indian Ocean, including all the island archipelagoes and also Madagascar, Ceylon, the Indian subcontinent and the shelf region of the Arabian Sea. From time to time Lemuria was joined to South-East Asia by an isthmus.

The continent of Lemuria was a lowland overgrown with dense tropical forests and bordered by volcanic mountain chains on the south-east, south and north. It provided favourable conditions for the rise and successful development of a new order of mammals, small animals that lived in trees and fed on insects. Gradually these animals became larger and, through the development of keener eyesight and more tenacious claws,

which changed into an organ that could seize things, into a hand, they acquired skill in climbing trees. Thus it was that the first primates, the lemurs, or half-monkeys, appeared on the scene between approximately 100 million and 70 million years ago.

Later, about 34 million years ago, big changes took place. Large sections of southern and south-eastern Lemuria began to subside; earlier, Madagascar had separated from the continent. Big changes also occurred in the order of half-monkeys. Some of the lemurs grew to a tremendous size and descended from the trees to the ground in search of food. The skeleton of a gigantic lemur, *Megaladapis*, one of the most amazing creatures that ever existed on our planet, has been discovered on Madagascar. Imagine a lemur as tall as a man, walking about on its two hind limbs, yet with a long tail and huge round eyes.

This line of evolution did not lead anywhere. It was not the "two-legged lemurs" that became masters of the planet but descendants of the half-monkeys who turned into "full" monkeys, who in turn gave rise to the branch of anthropoid apes. *Dryopithecus* is the name given to the fossil apes that evolved into the gorillas and chimpanzees of the tropical forests of Africa, on the one hand, and were the forerunners of modern man, on the other. Apes of the genus *Sivapithecus* are regarded as the most primitive of the *dryopithecus* apes because they combine features of all the anthropoid apes, whether gorillas, chimpanzees or orangutans.

Reshetov presents, in his monograph, facts indicating that the earliest primitive monkeys and, possibly, their more highly developed descendants as well, who lived in Lemuria, were

forced to migrate by the break-up of this continent, the final stage of which took place about 25 million years ago. The waves of migration moved westwards to Africa and northwards to India. Here, says Reshetov, "their late descendants, who lived in the north of India from four to four and a half million years ago, went over completely to life on the ground and to making systematic use of natural objects as tools". These were the "earliest ancestors of man".

Does the history of Lemuria end on that? Or could the last remnants of the continent have continued to exist in the Indian Ocean for a long time afterwards, not only in the Tertiary period, in which the lemurs and anthropoid apes arose, but also in the Quaternary period, in which man appeared? Could Lemuria have been the cradle of mankind instead of simply a bridgehead from which lemurs and primitive monkeys invaded all the continents (except Australia and Antarctica, those completely isolated parts of submerged Gondwanaland)? Only detailed exploration of the bed of the Indian Ocean, in the region where Lemuria existed, will answer these questions.

The most surprising part of it is that a study of the world's earliest civilisations reveals a whole series of riddles that can be solved only by using the hypothesis of Lemuria, a large land mass in the Indian Ocean that was inhabited not just by lemurs and not even by pithecanthropi, but by human beings who had reached a high level of civilisation!

Tamalalam, Nawalam and South Madura

Ancient Tamil historians believed that the original home of their people, Tamalalam, was situated on the island of Nawalam, "one of the

earliest lands to arise near the equator". Medieval treatises spoke of *sanghas*, associations made up of the leading poets and scholars. The earliest *sanghas* arose on the "Southern Continent", or Lemuria, about 10,000 years ago, in the earliest period of Tamil history. The *sanghas* ceased to exist after Lemuria and its capital, South Madura, sank into the Indian Ocean.

The Tamils, who have an ancient culture, speak a language allied to the languages of India that form the Dravidian family, spoken today by more than 100 million people. The Dravidians belong to one of the oldest ethnic groups in India. They lived there long before the belligerent nomad tribes of Aryans mentioned in the *Rig-Veda*, the sacred book of the Hindus, came to the "land of marvels". Today the Dravidian languages are spoken in Southern India, up to 18°-20°S, but they once covered Central and Northern India as well. Moreover, facts show that several thousand years ago the Dravidian languages were also spoken in Baluchistan and Southern Iran. The Dravidians may have been the first to settle in the Tigris and Euphrates area, preceding the Sumerians, whose civilisation is regarded as the oldest in the world.

Tamil legends claim that the original homeland of the Tamils (and, consequently, of all Dravidians) was once situated in the Indian Ocean but was swallowed up by the waves. The same legends regard the sunken land, Lemuria, to be the cradle of human civilisation. The surprising thing is that at least two out of three of the world's earliest civilisations turn out to be connected with people who spoke Dravidian languages.

The discovery, in the twenties and thirties, of a proto-Indian civilisation in the valley of the

Indus is considered by scientists to be the most important archeological find of the 20th century. Later excavations showed that India's oldest civilisation covered vast regions to the east and the south including, besides the valley of the Indus, the Kathiawar Peninsula, the environs of the present capital, Delhi, and even the valley of the Ganges. Although not so old, perhaps, as the two earliest civilisations, the Egyptian and Mesopotamian, it covered an area several times larger than Egypt did in her archaic period or the civilisation of Mesopotamia in antiquity.

What people produced the proto-Indian civilisation? The hieroglyphic inscriptions on the large number of seals and amulets found in India's oldest cities have helped to answer this question. Although no one has yet succeeded in deciphering the writing, a team of Soviet researchers has used electronic computers to establish the family to which the language of the hieroglyphic inscriptions belongs. Their first publication, entitled *A Preliminary Report on a Study of Proto-Indian Texts* appeared in 1965. The team included M. Probst, a programmer, G. Alexeyev, a paleographer and well-known specialist on ancient scripts, B. Volchok, Indologist, philologist I. Fyodorova, Y. Knozov, who is an expert on deciphering ancient scripts, and the present writer. The report was prepared under the auspices of the All-Union Institute of Scientific and Technical Information and the Institute of Ethnography of the Academy of Sciences of the USSR.

To begin with, the team used computers to make a statistical analysis of the texts in order to get a picture of the abstract grammar of "language X", as they called the language of

the proto-Indian texts. This means they ascertained whether the language used suffixes, prefixes and infixes (elements inserted in the body of words, as in some languages of the Caucasus), what its main grammatical structures were, and so on.

Next they compared "language X" with other languages. Following the discovery of the hieroglyphic texts scholars had advanced a multitude of hypotheses claiming that the proto-Indian language was related to the most diverse languages of the world, including many languages of India, Asia Minor, the Caucasus, the Himalayas and even the language of the Kets, a people who live along the upper reaches of the river Yenisei in Siberia, and the language of the inhabitants of Easter Island in the Pacific (many of the proto-Indian hieroglyphs are similar in shape to the pictographs of the *kohau rongo-rongo* script). One by one, Sanskrit, Hittite, Hurrian, Rapanui and many other languages were weeded out of the list of candidates for the honour of being the language spoken by the people who had created India's oldest civilisation. Finally, only one claimant was left, the Dravidian languages, whose structure turned out to be the closest to that of "language X". This furnished proof of the hypothesis, advanced by many scholars, that the proto-Indian civilisation was built up by people speaking Dravidian languages (or a Dravidian language). Indeed, a Dravidian "island", the Brahui language, has been preserved to this day among the sea of Indo-European languages spoken in Northwestern India. It is quite possible that in hoary antiquity the whole of this region was inhabited by peoples who spoke Dravidian languages.

The Sumerians and the Ubaid

It appears, in the light of recent findings, that the languages spoken by the earliest inhabitants of the country lying between the Tigris and Euphrates rivers, who preceded the Sumerians, may also have belonged to the Dravidian family. Linguists inferred the existence of this language when, studying the oldest Sumerian texts, they found that many words could not be explained by the rules of Sumerian but were cognate with some other language. Since these words signify vitally important objects and the main occupations (for example, the Sumerian words for "palm tree", "date", "plough", "weaver", "stonemason", "fisherman", "blacksmith", "coppersmith", "tin-smith", "farmer", "carpenter", "herder" and "merchant" are all borrowed), it became clear that the people who spoke "language X" gave the Sumerians the foundations of their civilisation.

An analysis of place-names likewise bears out the supposition that this people lived in the country between the Tigris and the Euphrates long before the arrival of the Sumerians. Idiglat and Buranun (as the Tigris and Euphrates are called in the cuneiform texts), and also the names of the oldest cities (Ur, Uruk, Nippur, Lagash, Kish and Eridu) are not Sumerian. The same is true of the supreme god of the Sumerians, En-Ki, "Lord of the Earth", who was adopted from the pantheon of earlier civilised inhabitants of the valley of the Tigris and the Euphrates. (Later the Sumerian priests remodelled the name and the god came to be called Ea.)

Thus the Sumerians were not the indigenous inhabitants of Mesopotamia. Where did they come from? From the western regions of Indo-

China, according to a recent hypothesis. Or from the Caucasus Mountains, according to another. Finally, written records have been discovered on the territory of Rumania that are amazingly similar to the oldest Sumerian writing but go back to a still earlier period and make us wonder if perhaps the Sumerians did not come from the Balkans.

But wherever they did come from, whether South-East Asia or South-East Europe, it is clear that they were an unmaritime people who learned navigation later, after they had settled their new home in the valley of the Tigris and Euphrates. Their original home must have been in the mountains. This is indicated by the Sumerian custom of placing images of gods on an elevation. The Sumerians moved from the north of Mesopotamia to the south, and not the other way round. And it was in Southern Mesopotamia that a sudden cultural upsurge took place in the second half of the fourth millennium B.C., leading to the rise of a civilisation there. Scholars explain that this was because a new, energetic population at an advanced stage of development reached Southern Mesopotamia. This population could not, obviously, have been the Sumerians. The culture, one of the world's earliest, was first revealed during excavations on a hill which the local inhabitants called al-Ubeid or al-Ubaid. Hence, these unknown people with their own language are known as the Ubaid.

Al-Ubaid is not far from the town of Eridu, the most southern of the ancient cities of Mesopotamia. Some 6,000 years ago it was a seaport at the head of the Persian Gulf. Later Eridu was cut off from the sea by the alluvia of the large rivers. From Eridu civilisation spread in a di-

rection opposite to the flow of the Tigris and Euphrates, to Uruk, Ur, Lagash and other cities.

Archeological excavation thus confirms the ancient Mesopotamian legends which say that civilisation was brought to Mesopotamia by a race of beings who were half-fish, half-men, headed by someone called Oannes, who sailed across the Persian Gulf to the city of Eridu. There Oannes furnished mankind instruction in writing, the arts and the various sciences. He taught men how to build cities and places of worship, how to till the soil and how to fashion the implements and tools they needed.

Scholars learned of the Oannes legend from the history written by Berossus, a priest at Babylonia. Knowing Sumerian mythology, they established that Oannes of Babylonia was Ea, the older Sumerian god of the waters, the "lord of wisdom", who taught people arts, crafts, building and writing. But Ea is only the remodeled god of the Ubaid, En-Ki. Thus, the Eridu legend in which Ea made mankind the gift of civilisation is not of Babylonian or even Sumerian origin but comes from the Ubaid. This is confirmed by archeology, which says that Eridu was where Mesopotamian civilisation was born. It was there that man made the leap from the Stone Age to the age of metals, irrigation and monumental buildings, among other attributes of civilisation.

Who were the Ubaid? "Linguistic excavation" (the isolation of Ubaid words in Sumerian texts and the discovery of Ubaid place-names) has given us about twenty Ubaid words and approximately the same number of place-names. We find that quite a number of Ubaid words are similar to Dravidian words or the roots of Dravidian words! Hundreds of communities in Southern

India have names that end in "ur". In the Dravidian languages the word "ur" means "settlement", "town" or "community". The oldest cities in Mesopotamia also have words with "ur" in the root, such as Uruk and Nippur, and a city that is actually called Ur.

Idiglat was what the Ubaid called the river Tigris. ("Id" means "river" or "water".) The name of the river Indus is perhaps cognate with it, for in the Dravidian languages the n/nd interchange occurs fairly often; originally it meant "river" or "water". (There is another river in Hindustan, the Ganges, that also means "water", this time in the language of the Munda.) Ubaid words for different occupations have the suffix "gar" (for example, "engar" means peasant, "nangar" carpenter, "damgar" merchant, and so on). In the Dravidian languages the word "gar" means "hand"; thus, the suffix "gar" could signify "maker", a peasant being a "maker of land", a carpenter a "maker of wood", and a merchant a "maker of trade".

We do not have enough facts, of course, to draw any final conclusions. Still, the similarity between Dravidian and Ubaid words is significant when we consider that there is an undoubted similarity between the proto-Indian culture and the civilisation of Mesopotamia.

Mesopotamia-Bahrein-India

Among the many hundreds of cylindrical seals belonging to the inhabitants of Mesopotamia archeologists have found several square seals fashioned by the proto-Indians. This shows that contacts existed between the two ancient civili-

sations. The "transshipment point" on the route from Mesopotamia to the Indian subcontinent was discovered in the sixties of the present century. It was the Bahrein Islands in the Persian Gulf. The civilisation that flourished there several thousand years ago combined features of the Sumerian and proto-Indian cultures. In the cultural and commercial exchange that had taken place on those islands from early times the Sumerian civilisation influenced the proto-Indian and the proto-Indian influenced the Sumerian.

The houses of baked brick brought to light in the Sumerian city of Ur, says the eminent British archeologist John Marshall, are a marked exception to the general rule. But they so closely resemble the small, rather carelessly built houses of late Mohenjo-Daro that it is easy to see under whose influence they were built. The same influence was also felt in religion. In a tomb in Ur, archeologists found a statuette of a monkey seated on its haunches that is similar to the figures of monkeys found in Mohenjo-Daro. (These monkeys were probably the original model for Hanuman, a monkey god that assists Rama, the hero of the ancient Indian epic *Ramayana*.) The Indian archeologist S. K. Dikshit says that since the monkey was known to the civilised world in antiquity as a typically Indian animal, and since the monkey would hardly have been depicted in sculpture if it were not held to be sacred, it may be assumed that in the Bronze Age the countries of Western Asia adopted some of India's religious notions.

However, the statuette could have belonged to a proto-Indian merchant living in Mesopotamia for, says Dikshit, merchants in western countries probably did not hesitate to recognise

as legal a deal concluded under the protection of the sacred gods represented both by the "proto-Hanuman" and the other animals depicted on seals found in Mesopotamian cities.

Although the style of a painted vase that was found in the ruins of a Sumerian city is strictly Sumerian the subject of the painting is of Indian origin. It portrays a zebu, an Asiatic ox with a large hump, standing before a ritual manger—one of the favourite subjects on proto-Indian seals. In the opinion of Gordon Childe, a leading expert in the archeology of the ancient world, the Sumerian artist must have witnessed the performance of Indian religious rites in Mesopotamia. There is nothing surprising in this, since entire caravans or flotillas of Indian merchants must have engaged in trade in Mesopotamia. They may have been detained in Sumeria for months, particularly at the time of fairs, to sell their goods and lay in cargo for the return voyage. In the light of what we know about commerce in the East in the second millennium B.C., it would be quite logical to assume the existence of a permanent colony of Indian merchants living in some convenient Sumerian city.

All the finds mentioned above are the result of cultural exchanges between two established and distinctive civilisations. Yet—and this is the most interesting point—many features similar to both the proto-Indian culture and the ancient civilisation of Mesopotamia cannot be explained by borrowing or cultural exchange. These features speak, rather, of an ancient and deep *kinship* between the two cultures and between the men who created them. As we have already noted, the Dravidian language of the proto-Indians is probably cognate with the lan-

guage of the Ubaidis who preceded the Sumerians.

A number of ornaments and symbols found on proto-Indian seals and amulets have a kinship with the ornaments and symbols of the earliest dwellers in Mesopotamia and Elam.

The square seals found in Mesopotamia were undoubtedly brought there by proto-Indian merchants. And on square seals found on the Indian subcontinent we see subjects and deities which reflect the mythology and religion of Mesopotamia. (Both the shape of the seals and the legends on them tell us that they were made in India and not brought there from Sumer.) Three amulet seals found at Mohenjo-Daro depict a man engaged in battle with two tigers. The figure is strikingly like Engidu, comrade of the hero of the Gilgamesh Epic, who helped Gilgamesh in his struggle against wild beasts. Another Mohenjo-Daro amulet-seal shows a horned man with the legs and tail of a bull, struggling with a horned tiger. The horned tiger is probably an evil spirit that wages a constant war on its enemies, says Ernest Mackay in his book *Early Indus Civilisations*. This half-man, half-ox is astonishingly like one of the Sumerian half-gods or heroes, which evidently indicates a remote connection between some of the popular beliefs of the two cultures, according to Mackay. It is possible, he says, that some third country with whom the people of Sumer and the people of the Indus Valley maintained close ties in the remote past played the role of intermediary.

Anthropological findings as well as the data of linguistics, archeology and the history of religions speak of kinship between the early Mesopotamians and the proto-Indians. Most of the

skulls of proto-Indians are identical with the skulls of Ubaid. A remarkable statue found in the ruins of Mohenjo-Daro—archeologists have named it “portrait of a priest”—has a face that is very like those of men in early Mesopotamian sculpture.

Several scholars, among them Samuel Kramer, whose field is the Sumerian language, think that the proto-Indian culture was created by the Ubaid, who were pushed out of their original home in Mesopotamia by the Sumerians and settled in the Indus Valley. It is possible, however, that the ancient kinship between inhabitants of Mesopotamia and the Indian subcontinent stems from the fact that the Ubaid and the proto-Indian civilisations arose from one and the same source, a source to be found neither in Mesopotamia nor in India but somewhere else.

India's earliest civilisation was called the Indus Valley culture since it was thought that this culture occurred in that valley. But archeologists have found proto-Indian cities and settlements between the Ganges and Jumna rivers, in the Siwalik Hills in the Punjab, and in the Bombay area south of the mouth of the Indus. It is noteworthy that the “southern cities” are as old as Mohenjo-Daro and other settlements in the Indus Valley, evidence in support of the hypothesis that the Indus Valley was not the cradle of proto-Indian civilisation. We do not know where it was situated. At any rate, no traces have yet been found on the Indian subcontinent of the culture from which the proto-Indian civilisation directly sprang. Although archeologists in India and Pakistan have discovered several older cultures they cannot be considered predecessors of Mohenjo-Daro, Harappa and other

proto-Indian cities; they are not connected with them genetically. The roots of the proto-Indian civilisation, say archeologists, are still a mystery.

The Land Known as Elam

The features which the proto-Indian culture and the Mesopotamian culture have in common may quite possibly be explained by the fact that the people who created the oldest Indian civilisation and the first men to develop the valley of the Tigris and Euphrates were cognate peoples speaking Dravidian languages. Or perhaps they were simply one and the same people. It is also possible that the Dravidian languages may have been common to other peoples besides the Ubaid and the proto-Indians.

The region east of the Tigris, in Iran, called Khuzistan, was once known as Elam. A civilisation flourished there 5,000 years ago with city-states, a distinctive culture and a written language. Scholars find that the culture of the Elamites had many features in common with that of Mesopotamia, and even more so with the proto-Indian culture.

The Elamites spoke and wrote a language with which it has been impossible so far to find affinities. Linguists have attempted, unsuccessfully, to demonstrate that Elamite is related to the Turanian (Ural-Altaic, Turkic and Mongolic languages), to the numerous Caucasian languages, or to the dead languages of Asia Minor (Hurrian, Kassite, etc.). "The only hypothesis supported by a few indicative facts is that of an Elamo-Dravidian relationship," says the eminent Soviet historian and linguist I. Dyakonov in his mono-

graph *Languages of Ancient Asia Minor*. Dyakonov cites examples showing affinities between Elamite and the languages used by the Dravidians. In the Dravidian languages the root "ketu" means "perish" or "be destroyed". In the Elam language it means "destroy". The word for "day" in Elamite is "nan" whereas in the Dravidian languages this root "nan" means "morning", "dawn" and "day". The root "pari" in Elamite means "reach", while in the Dravidian languages it means "flee" or "evade".

Languages borrow words from one another, of course. Besides, sounds and meanings may accidentally coincide (for example, both in English and Kabardinian, a language of the Caucasus Mountains, the numeral 2 sounds the same, although there is no relationship between the two languages). But the important thing is that Elamite and the Dravidian languages have many common grammatical structures, and grammatical structures are never borrowed. This speaks either of ancient affinities or of contacts over a long period of time. Both phonetically and morphologically Elamite is similar to the Dravidian languages. And the pronouns are so similar that, says Dyakonov, "they sometimes fully coincide".

The affinities between Elamite and the Dravidian languages have led Dyakonov to assume that "tribes related by language to the Elamites and the Dravidians were scattered throughout Iran, or at any rate, throughout southern Iran, in the fourth and third millennia B.C. and perhaps later as well. Besides, traces of Dravidian toponymy (true, they do not date back to any definite period) have evidently been found on the Arabian Peninsula, while traces of an admixture

of the Dravidoid (South Indian) race have been noted, say some researchers, in several regions of southern Iran." Later the dark-skinned Dravidians, or peoples related to them linguistically and racially, were forced out of Iran or were completely assimilated by the newcomers. True, Herodotus, who lived in the fifth century B.C., still called the inhabitants of Baluchistan, a country situated between India and Elam, "Asiatic Ethiopians" (that is, "Asiatic Negroes"), which might mean that dark-skinned people inhabited the area between Iran and India as late as about 2,500 years ago.

It is fully possible that Elamite and the Ubaid languages branched off from the common Dravidian stock at an early date, and this explains the similarities and the differences between them. There might be another explanation. The Dravidian languages, the language of the Ubaid who preceded the Sumerians, and Elamite might all go back to a more remote common language. They might be three branches of that language.

Most of the Elamite texts are written in the cuneiform script that the Elamites borrowed from their Western neighbours, the Akkadians and the Sumerians, in the middle of the third millennium B.C. Before that the Elamites used hieroglyphics. And still earlier they had a pictorial graphic system called proto-Elamite.

Proto-Elamite writing has not yet been deciphered. In appearance the texts and the pictorial characters are very like proto-Sumerian, the earliest Mesopotamian writing. The inhabitants of Mesopotamia also wrote on clay tablets, using a pictorial-linear form of writing and, like the proto-Sumerian texts, they were evidently also household accounts and business documents.

A third proto-writing, characters of which have been found at Harappa, Mohenjo-Daro and other prehistoric sites on the Indian subcontinent, has affinities with the characters in proto-Sumerian and proto-Elamite scripts. The earliest Mesopotamian texts are written in Sumerian, as recent studies by A. Vaiman of the Soviet Union have shown, although the first inhabitants of the valley of the Tigris and Euphrates were not Sumerians but Ubaidis, who spoke a language cognate with the Dravidian languages.

The language of the proto-Elamite texts, probably the earliest form of the Elamite language, differs from the language of the proto-Sumerian inscriptions. Proto-Indian texts conceal the Dravidian language rather than the Sumerian or Elamite; therefore, proto-Sumerian writing cannot provide a key with which to decipher the mysterious scripts of the Indian subcontinent and Elam, especially since proto-Sumerian writing has been only partially deciphered. Scholars can read only 250 of the 800 characters in proto-Sumerian writing. Still, the similarity among the characters of the three proto-writings leads one to think that they were derived from a single common ancestor. After all, the cuneiform script later invented by the Sumerians was used to record the Akkadian, Elamite, Urartean, Hittite and other languages that bear no resemblance to Sumerian. One can find a common basic stock of similar characters among the characters used in proto-Sumerian, proto-Elamite and proto-Indian writing.

Philologists and toponymists use the term "substratum" when speaking of languages and place-names that precede the languages and names they are studying. When it comes to the characters

in early writings we may also speak of a "substratum", an initial pictorial graphic system that came before the proto-Sumerian, proto-Elamite and proto-Indian writings. Since the proto-Sumerian texts are the oldest, and the first inhabitants of Mesopotamia, before the Sumerians, were the Ubaid, we may use the word "Ubaid" to designate the oldest system of writing. (This was not writing in the full sense of the word but sooner a language of drawings, the pictography that preceded archaic forms of writing.) The system existed in Mesopotamia before the Sumerians came there. The Sumerians adopted the system and used it to develop their own writing, the proto-Sumerian, in the same way that they adopted and developed other Ubaid material and intellectual achievements.

The same thing may have happened on both the Indian subcontinent and Elam. The similarity of the proto-Indian, proto-Elamite and proto-Sumerian scripts is again explained by their Dravidian basis. The Ubaid language is perhaps a cognate language, like the language of the Elamites and the proto-Indians. Dravidian "basic writing", like a Dravidian "basic language", may have existed in remote antiquity. The Ubaid, proto-Indian and Elamite pictorial characters may be offshoots of that "basic script", in the same way that the Ubaid, Elamite and proto-Indian languages are offshoots of the "parent Dravidian language".

The "Dravidian Problem"

When and where did the Dravidian parent language arise? When did it begin to disintegrate and send offshoots from the common trunk that

later developed into independent languages which could in their turn produce new languages? By employing mathematical methods modern linguistics has been able to establish the period when individual languages began to branch off from the single Dravidian ancestor or, more correctly, proto-Dravidian ancestor, as separate entities. The first was Brahui, the only Dravidian language spoken in Northern India. That happened about 6,000 years ago. It has not yet been established, however, whether proto-Dravidian was formed in India or was brought in from outside.

The more than 500 languages and dialects spoken today on the territory of India, Pakistan and Bangladesh belong to one of three large families: the Indo-European, Munda and Dravidian. Scholars say that the speakers of the Indo-European languages, the legendary Aryans, came to Hindustan (Northern India) in the second millennium B.C. (Where they came from is still debated; the three most probable places are Central Asia, the Black Sea area and Asia Minor.) It was believed for a long time that the dark-skinned tribes speaking the Munda languages were the oldest inhabitants of India. However, the latest linguistic findings show that they appeared in India only 6,000 years ago. They came from the east, from Indo-China, where languages cognate with the Munda languages and dialects are still spoken today.

The most surprising thing is that the Dravidian languages are also alien languages, although they appeared in the Indian subcontinent before the Indo-European languages and possibly before the Munda languages.

We have mentioned the kinship between the Ubaid and Sumerian languages and the Dravid-

ian languages. Place-names in Mesopotamia as well as in Iran, Afghanistan and even the Caucasus can be interpreted if one proceeds from the Dravidian languages, says the Indian scholar T. B. Nayar. Another eminent scholar, N. Lahovary, points out in his book *Dravidian Origins and the West* that the Caucasian and Dravidian languages have many features in common. Nayar and Lahovary believe that Dravidian tribes reached India in approximately the fourth millennium B.C.

With reference to such a remote period it is better, however, to use the term "proto-Dravidians", in the same way that "proto-Dravidian languages" is a more precise term than "Dravidian languages". Many anthropologists believe that the proto-Dravidians differed substantially in appearance from modern Dravidians, that they were people of a lighter complexion and taller stature, for example. There is evidence that the Toda, one of the most mysterious tribes of the Indian subcontinent, who live in the Nilgiri Hills in the middle of Southern India, have preserved features of the ancient proto-Dravidians best of all because they have been in almost total isolation for so many centuries. The language of the Toda is a Dravidian language. The Toda priests employ a special ritual language, the "kwoorjam" or "kwoorsham", in which the names of many deities coincide with those of the ancient gods of Mesopotamia!

The original home of the Dravidians may have been Sumer, Elam, Iran or the Caucasus Mountains, experts say. These hypotheses can be combined into a single, broader hypothesis: that in remote antiquity Mesopotamia, Iran, the Caucasus Mountains and possibly part of Central

Asia were inhabited by tribes speaking the Dravidian languages. But was this extensive area the home of the Dravidians?

According to some scholars, the proto-Dravidians, nomads who roamed from the borders of Sumer and Elam to the Amu Darya, the Syr Darya and the Caucasus, reached the Indian subcontinent about 6,000 years ago via convenient mountain passes in Northwestern India. Although the Dravidians are an ancient people of India it is an indisputable fact that they came from somewhere else. The evidence that the Dravidian languages are related to some of the earliest languages of Mesopotamia, Elam and the Caucasus is convincing. This does not necessarily mean, though, that the proto-Dravidians came to India from those places. On the contrary, linguistic data indicate that the Dravidian languages spread from south to north rather than from north to south.

In a survey of the languages of India, Pakistan, Ceylon and Nepal, Soviet Indologist G. Zograf notes that the theory that the Dravidian peoples moved from south to north and not in the opposite direction has gained more and more recognition of late. (For example, tribes speaking Kurukh, a Dravidian language, and living in the northeastern part of Central India, have a legend which says that their ancestors once lived in Southern India.)

This is indeed odd, for south of the Indian subcontinent lies the Indian Ocean, in which the proto-Dravidians could not possibly have developed and then moved northwards into India, Mesopotamia and Elam. But it will not seem so odd if we recall that Lemuria, a land which sank in the Indian Ocean, was situated,

say many geologists and oceanographers, in the part of the ocean that divides India from Africa. Early Dravidian legends say the same thing—that their original homeland lay south of the Indian subcontinent and that it sank into the ocean several thousand years ago.

Ships from the Land of Melukha

India has been inhabited since Paleolithic times. The Dravidians, the Munda and the Aryans, that is, the speakers of the three big families of languages of modern India, were all aliens. The first to arrive were the Dravidians (was it from the south?). They were followed by the Munda from the east and, 2,000 to 3,000 years later, by nomad Aryan tribes from the north-west. The Aryan tribes brought with them the Indo-European language or, rather, a number of closely related dialects. There is no doubt that the Aryans came by land, for they drove before them their cattle, their chief property, wealth and pride, to which many beautiful lines of poetry are devoted in the hymns of the *Rig-Veda*, an epos composed during the period when the Aryans first arrived on the Indian subcontinent. Tribes speaking the Munda languages entered India from South-East Asia by land. They had no navigational skills whatsoever. The same cannot be said of the Dravidians, however.

The people of the Toda tribe, which many scholars consider the purest representatives of the proto-Dravidians, raise cattle. But they have preserved an old song about ships, a song that could be a folk memory of the sea route by which their ancestors reached India. Archeologists have

found a large amount of Dravidian merchandise in excavated Mesopotamian cities. This merchandise is included in the list of rare objects brought to King Solomon. Among the items is sandalwood, which grows on the Malabar coast of Southern India and nowhere else in the world. At first it was believed that goods from Southern India were brought west by Sumerian merchants, that Mesopotamia ruled the waves of the Indian Ocean and its inhabitants plied the Persian Gulf-Arabian Sea-Indian Ocean route. Recent investigations, though, indicate that this is not so. The inhabitants of Dravidian India were most likely the first to voyage across the Indian Ocean.

The first excavations of proto-Indian cities in Mohenjo-Daro revealed pictures of ships with masts. The British archeologist Ernest Mackay, who was among the first to discover India's earliest civilisation, believed that the inhabitants of the cities of the Indus Valley widely used the sea route to Sumer.

The question of whether these voyages were made by the Mesopotamians, the proto-Indians or perhaps the Arabs, was left open by Mackay. It can be answered thanks to the latest archeological discoveries. In the eastern section of Lothal, the world's oldest seaport, discovered by Indian researchers on Kathiawar, a peninsula not far from the big modern port of Bombay, a rectangular brickpaved shipyard that measures an impressive 218 metres by 37 metres has been excavated. A canal seven metres wide had been dug to connect this large shipyard with a river flowing into the Arabian Sea. It is noteworthy that Lothal, which lies far to the south of the Indus Valley, is just as old as Mohenjo-Daro, Harappa

and other proto-Indian towns. It was founded about 4,000 years ago.

Scientists studying Mesopotamia, the country at the other end of the ancient trade route, have discovered interesting things. Babylonian cuneiform texts speak of places called Magan and Melukha, linking up those countries and the goods brought from them (ebony and other valuable woods) with East Africa.

Sumerian inscriptions dating back 4,000 to 4,500 years often mention Magan and Melukha. Magan exported valuable woods, and Melukha, situated still farther out in the Indian Ocean, exported gold dust, pearls and lapis lazuli. It was called the "dark country", evidently because of the colour of its inhabitants. The important thing is that it was not the Sumerians who voyaged to Melukha but the inhabitants of Melukha who came to Mesopotamia to carry on trade. Texts speak of "men of the ships of Melukha", and archeologists have found a Sumerian seal belonging to an interpreter from the Melukha tongue.

Sumerian sources mention the large size of the *magulim*, the ships of Melukha. Some scholars are inclined to see the Dravidian *manci* in the word. A *manci* was a big cargo ship of from 10 to 40 tons, and the word is still used by the Kanarese, Malayalam, Tulu and Tamils, Dravidian peoples living along the western and southern coasts of South India. From this we may assume that when the Sumerians spoke of Melukha they meant Dravidian India.

It is quite possible that ships from Melukha voyaged not only to the shores of the Persian Gulf but also to Arabia and even Egypt. Among the numerous rock drawings found in Upper

Egypt, in the area bordering on the Red Sea, there are pictures of ships unlike those on which the ancient Egyptians sailed the Nile. At Djebel el-Araq on the Red Sea, at the spot where boats set out for the Nile Valley down the Wadi-Hammamat, now dried up, the handle of a knife has been found with a picture on it of a sea battle between Nile boats made of papyrus and boats with high prows and sterns.

At first many scholars believed that the foreign ships depicted on those rock drawings in Upper Egypt were Sumerian. After analysing the latest discoveries, however, the well-known Indian archeologist S. R. Rao suggests that the vessels belonged to people from Dravidian India, the land of the proto-Indian culture. Perhaps, though, the boats that sailed across the Persian Gulf, touching at Sumerian ports on the coasts of the Arabian Sea and the Red Sea, came from somewhere else. Perhaps from Magan, a land of proto-Indians, or from Melukha, situated still farther south, a land that now lies on the bottom of the Indian Ocean. Sumerian texts also mention a third country, Dilmun, perhaps the most enigmatic of them all.

Search for the "Sumerian Paradise"

Before dwelling on the search for Dilmun it would perhaps be well to summarise what has gone before.

A study of the Dravidian languages, their comparison with the languages spoken by the early inhabitants of the Indian subcontinent, Mesopotamia and Elam (possibly not only Elam but also the regions of Iran, even up to

and including Central Asia, and also the Caucasus), and a comparison with the place-names and languages of Arabia lead many scholars to assume that the speakers of the Dravidian languages once inhabited a vast territory that stretched from the Caucasus Mountains and Central Asia to Arabia and India. The Indian subcontinent cannot be considered the birthplace of these languages. It is believed that they spread from the south, and not from the north or the north-west, since the greater share of those who speak the Dravidian languages live in south India.

The men who built the proto-Indian civilisation and the predecessors of the Sumerians, the Ubaid, may have spoken Dravidian languages or cognate languages. Kramer and other scholars believe the proto-Indian culture was brought to India by the Ubaid, who were driven out of Southern Mesopotamia by the Sumerian newcomers. The myths of the earliest inhabitants of Mesopotamia say that civilisation was brought to that area by En-Ki, the "Lord of the Earth" who founded Eridu, the southernmost city in Mesopotamia. Could all this mean that civilisation came to India and Mesopotamia, and perhaps to Elam and even Egypt, from some unknown place? The men who created that civilisation were dark-skinned and spoke Dravidian languages. And according to ancient legends of the Dravidians, their original home was Lemuria, now at the bottom of the Indian Ocean.

Could mention of this legendary country perhaps be found in other sources besides Indian and Sumerian legends? It does not necessarily have to be called Lemuria, Nawalam, Tamalaham or the Southern Continent. The name could

have been changed by the Sumerians. After all, they did turn the Ubaid god En-Ki into the god Ea. Besides, the Dravidian names for the sunken continent date back to the Middle Ages, and they could have changed substantially by then.

The god Ea, who was En-Ki, the Mesopotamian Poseidon, God of the Sea, brought civilisation to Eridu, the southernmost city in Mesopotamia. En-Ki himself lived in Dilmun, a land from which disease and death had been banished, where fresh water gushed from springs, where human life was happy and carefree.

This, it is easy to guess, was the Sumerian paradise, the Sumerian promised land, the prototype of the Biblical paradise. It might seem obvious that Dilmun was a mythical land that never actually existed. Yet this is not so, for we find mention of "ships from Dilmun" in very early business documents of Mesopotamia. Later Assyrian sources say that King Uperi of Dilmun paid tribute to King Sargon II of Assyria. Another Assyrian ruler carried rich plunder out of Dilmun, including copper, bronze and precious timber. Dilmun soldiers helped the Assyrian despot Sennacherib to level Babylon, "mother of cities", to the ground. To sum up, although mythology gives the domain of Ea the typical features of paradise, Dilmun was a country that actually did exist.

Where? Dilmun was called "the land from which the sun rises". Hence, it must have been situated east of the valley of the Tigris and Euphrates. When archeologists discovered, on the Bahrein Islands in the Persian Gulf, a civilisation that was an "intermediate link" between the cultures of Mesopotamia and India, they decided they had found the mysterious Dilmun. Not long ago,

however, Kramer put forward weighty arguments against considering that the Bahrein Islands could have been Dilmun. One argument is that there are no elephants on the islands, although ivory was the most important Dilmun export. Another is that no sanctuaries of the god of water have been found there. Kramer himself thinks that when the Mesopotamians spoke of Dilmun they had in mind India and the proto-Indian civilisation, with its cult of water, its navigation and its tamed elephants.

Further investigations, however, may well lead us to re-examine the question of where Dilmun was situated. The location may have to be shifted southwards as well as eastwards of the delta of the Tigris and Euphrates, out into the Indian Ocean. This question cannot be answered until the floor of the Indian Ocean is thoroughly explored and the hieroglyphic texts written by those who created the proto-Indian civilisation are deciphered. (The word Dilmun, in Kramer's opinion, is an Ubaid rather than Sumerian word, and if the proto-Indians called their country Dilmun there are chances of finding that name in inscriptions on seals or amulets.) Here, too, in their study of the origin of the earliest civilisations of Mesopotamia and India scholars will be assisted not only by archeology, anthropology, linguistics and the deciphering of early writings, but also by a science as far removed from all that as oceanology.

Egypt: Riddles That Outdate the Sphinx

Oceanology may also help to clarify the origin of one of the world's oldest civilisations, the Egyptian. Ever since the Egyptian hieroglyphics

were deciphered fifty years ago many Egyptian secrets have been unravelled, including the riddle of the sphinx, a monster with the face of a pharaoh of the Old Kingdom. But the roots of Egypt's culture, the origin of her hieroglyphics and the factors behind her "leap forward" from a primitive culture to a high level of civilisation some 6,000 years ago are still a mystery. While the riddle of the sphinx has been solved, what Egypt was like before she had either sphinxes or pyramids remains unknown.

Finds in the Sahara Desert offer conclusive evidence that in the eighth, seventh, sixth and fifth millennia Egypt was not a centre of civilisation but merely a province of a Stone Age culture that was dispersed over a large area in North Africa. A comparison of rock drawings in the Nile Valley earlier than 4,000 B.C. with the paintings of Tassili, Fezzan and other areas in the Sahara show that Egyptian art in that period was "provincial" both from the point of view of technique and aesthetic merit. Later, the fertile Sahara turned into a desert, the "centre" perished, and the Nile Valley suddenly emerged from the age of stone into the age of metal, from a primitive culture to a civilisation with writing, a state machinery, priests and officials, a system of irrigation, cities and the rest.

What enabled the Nile Valley dwellers to make this great advance? And was that civilisation created by the indigenous population or by newcomers? An enormous number of facts collected by scientists, from archeologists to botanists, show that the Egyptian civilisation is autochthonous, that it grew out of the local Stone Age cultures. Nevertheless, there are blank spots. There are fields in which one cannot trace a direct

line of continuity between Egypt's Neolithic era and the high civilisation that followed it.

Take Egyptian hieroglyphics. A written language is one of the major attributes of civilisation. Stone Age tribes and peoples did not need scripts; pictographs sufficed. But as states arose, writing was needed to record chronicles, myths and traditions and, most important, to keep business accounts and records. In Mesopotamia and ancient China we can trace the slow and laborious process by which a pictorial graphic system was developed into a system of writing, in other words, the conversion of pictures into symbols. But we cannot do this in Egypt. From the numerous rock drawings discovered by archeologists in the Nile Valley we know that the ancient Egyptians were familiar with the "language of drawings". But although the number of Egyptian written records is immense no one has been lucky enough so far to find the "missing link" that would show how picture characters developed into the characters of writing.

Sheets of slate found in Egypt's oldest cities are covered with picture characters and drawings of genre scenes. This is still pictography. But we find that later texts are in a fully developed script. As a matter of fact, this writing was so well developed that the inhabitants of the Nile Valley used it without any substantial changes for more than 3,000 years.

Egypt's earliest literary monuments are texts drawn on the inner walls of the pyramids of pharaohs of the fifth and sixth dynasties. They are about 5,000 years old. These texts, in the words of Academician Turayev, an eminent Russian Egyptologist, "are probably man's ear-

liest religious literature" and "among the most important monuments of the human race". While the texts are written in a very ancient language the writing itself cannot be called archaic. It corresponds to the "classical" canon, to the graphic system which the ancient Egyptians used throughout their history. We find no traces of searching, testing or imperfection in the pyramid writing itself, although the language and content of the texts take us far back into remote antiquity. The writing is beautifully adapted to the language which it records, and it is so advanced that complex religious and philosophical ideas can be expressed by it. By comparison, in Mesopotamia the earliest written records are primitive household accounts. Only many centuries later, after long quests, did Sumerian writing become a medium for expressing religious and philosophical ideas.

History abounds in examples of a country borrowing the system of writing used by another civilisation and people, with changes to make it suitable for its own language, of course. Many peoples in the Near East, for instance, used Mesopotamian cuneiform; the Greek alphabet is the basis of the Coptic, Slavic and Etruscan alphabets; the Japanese originally used Chinese writing. Is it possible, then, that the Egyptians borrowed their writing from another people?

Many Egyptian hieroglyphics look like the pictorial characters of scripts used on the Island of Crete. But the Cretan civilisation came later than the Egyptian. Egyptian writing might have had an influence on Cretan writing, but hardly the other way round. Although writing appeared in the valley of the Tigris and Euphrates before it appeared in the Nile Valley, the characters

of the earliest Mesopotamian writings are quite unlike Egyptian hieroglyphics, which depict strictly local flora and fauna, local deities and typical features of the ancient culture of the Egyptians.

It is easy to trace an inseparable connection between Egyptian hieroglyphics and Egyptian fine arts; they are based on a common style, a common attitude, a common "model of the world". Hieroglyphic writing is part and parcel of Egyptian civilisation. Why is it, asks Academician Turayev, that by the time of the pyramids Egyptian writing was fully developed, and there were poetry, *belles-lettres* and scientific and legal literature, but there is no trace of how they all reached that level? There is no single answer to this question.

Many other aspects of Egyptian culture are, like the origin of the writing, debatable, hypothetical or unknown. Egypt's civilisation arose on soil created by the Neolithic era, and many things about that period are still unknown. In her monograph *Egypt Before the Pharaohs*, Soviet scholar H. Kink points out that we cannot say anything definite about the origin of the Neolithic era in Egypt, and recent finds indicate there may be unexpected revelations.

The connection between Egypt's Neolithic period and the ancient cultures of the Sahara is obvious. It is equally obvious that there was some reason why the "leap" from the Stone Age to the Bronze Age, from a primitive society to a civilisation, took place in the Nile Valley. Could it be that the reason lies not so much in the physical features of the region as in some external stimulating factor? Is it possible that all four of the earliest civilisations—the Eryp-

tian, Ubaid-Sumerian, Elamite and Dravidian-proto-Indian—originated in one place, in Lemuria? If oceanography confirms the existence, in the Indian Ocean, of land that subsided several thousand years ago many pages of man's earliest history will have to be rewritten. After all, the history of ancient Greece had to be re-examined after the discoveries of Schliemann and Evans, and the history of ancient India after the excavations of proto-Indian cities.

Turkmenistan-Sumer-Lemuria

Soviet archeology may well be on the verge of the discovery, on the territory of Southern Turkmenia, of a civilisation that is as old as the proto-Indian and Elamite cultures. This civilisation may also have originated in Lemuria. Excavations carried out in recent years in Southern Turkmenia show that cities, temples, fortress walls and high towers were built there some 5,000 years ago. Terra-cotta statuettes found in occupational levels laid down in the third and second millennia B.C. amazingly resemble statuettes found in Mesopotamia during excavations of the Ubaid culture.

South Turkmenian statuettes of the second millennium and even the third millennium B.C. are inscribed with characters similar to the proto-writing of the Sumerians, Elamites and inhabitants of the Indian subcontinent. So far only slightly more than 20 South Turkmenian hieroglyphics have been brought to light. Since their shape is conventionalised and sketchy, it is not surprising that some are similar to characters in other scripts. But take, for example, the fact

that a star with eight points is found on South Turkmenian statuettes and also in proto-Sumerian writing, where it means "deity" or "sky". This could hardly be just a coincidence since a star is usually depicted as having five or six points. There is no doubt about the similarity between other Southern Turkmenian hieroglyphics and characters in the proto-Sumerian, proto-Indian and, particularly, proto-Elamite scripts. Evidently there are common features and common roots.

It would be premature to assert that a proto-Turkmenian script existed more than 4,000 years ago, at the time of the proto-Sumerian, proto-Elamite and proto-Indian writings. Not a single connected text in "South Turkmenian hieroglyphics" has as yet been found; all we have are separate characters or groups of symbols.

The assumption that writing was developing in Southern Turkmenia on the same pictorial basis as in Mesopotamia, Elam and India offers the best explanation of the similarity. If writing in Turkmenia had been borrowed ready-made from Mesopotamia or Elam we would find finished texts and not the "attempts at writing" that are to be seen on the statuettes.

A thin terra-cotta slab with three different characters, one of which is repeated four times, was discovered recently in one of the earliest cities in Southern Turkmenia. The whole thing, says historian V. Masson, reminds one of an exercise written by a child who is trying hard to learn letters of the alphabet. A local archaic system of writing may have been developing there.

Future excavations may show how far this process went. Did the inhabitants of ancient

Turkmenistan create a writing of their own? (Discovery of "clay books" on the territory of the Soviet Union would be a major archeological event of the century.) Or did they remain in the initial stages of the development of writing? In the middle of the second millennium B.C. the ancient cities in Southern Turkmenia declined and were abandoned by the inhabitants. The South Turkmenian civilisation perished at about the same time as the proto-Indian, and the reasons are still unknown.

Among the items in a hoard discovered in the wall of a house when archeologists from Ashkhabad excavated the ancient South Turkmenian town of Altyn-Depe in 1960 were three elongated pieces of ivory with circles carved on them. Identical pieces were found during excavations of proto-Indian cities. We know from ancient Indian texts of a later period that the ivory pieces were used in fortune-telling (the fortune-teller studied the combination of circles on the ivory pieces after they had been tossed into the air and had fallen to the ground). Were there trade contacts with India? Did the peoples of the South Turkmenian and proto-Indian cultures have similar religious beliefs? Or did these peoples perhaps originate from the same stock?•

An analysis of the skulls and skeletons of ancient dwellers of Southern Turkmenia shows that anthropologically they were closest of all to the proto-Indians who, in their turn, were close to the Ubaid. It is doubtful whether, in those remote times, there was a mass migration of proto-Indians into Turkmenia or of Ubaid into India. It is more likely that in the fourth and third millennia B.C. people with cognate languages and cultures and with a physical resemblance

migrated northwards into the valley of the Indus, into the valley of the Tigris and Euphrates, into Elam and then on to the shores of the Persian Gulf, along the Zagros Mountains into the depths of Iran, and farther into Southern Turkmenia. In all these places the newcomers mingled with the local population and as a result there arose the Sumerian, proto-Indian, Elamite and South Turkmenian civilisations. (This would also explain the local distinctions of those ancient cultures.) Perhaps a branch of those "newcomers from the south" reached the Red Sea and the Nile Valley where, mixing with the native population, it gave rise to the ancient Egyptian civilisation. Since the role of the African population here was very great, Egyptian culture differed substantially from the cognate proto-Indian, Sumerian, Elamite and South Turkmenian cultures.

Was Lemuria the cradle of our oldest civilisations? Was it wiped out suddenly? Can information about it be found in ancient sources?

Islands in the Indian Ocean

Daring proto-Indian seafarers voyaged in the Indian Ocean 5,000 years ago. The beginnings of Arab navigation evidently also go back as far as that. The Egyptians of antiquity likewise sailed in the Red Sea and the Indian Ocean. Later, Greek sailors ventured out onto trade routes in the Indian Ocean. In all ancient records—Arab, Egyptian, Greek and Roman—we find mention of rich and fabulous lands and islands in the Indian Ocean.

Papyrus No. 1115 in the collection of the Hermitage Museum in Leningrad contains one of

the most remarkable literary monuments of ancient Egypt. This is a tale told by a shipwrecked sailor, and it was brought to the attention of the world by the Russian Egyptologist V. Golenishchev, who translated it in 1881, adding a commentary in which he compared the story with Homer's *Odyssey*, the Arabian Nights tales about the voyages of Sindbad the Sailor, and stories from the Bible. Since then the tale of the shipwrecked sailor has been translated into many languages and has been subjected to thorough linguistic, historical and literary analysis. It is used as study material in almost all courses in ancient Egyptian history. Nevertheless, the tale contains many unclear and debatable points.

It is the story of a voyage in the Red Sea and the Indian Ocean made by a crew of Egypt's finest sailors in a ship 120 cubits long and 40 cubits wide. The vessel was overtaken by a storm in the open sea and sank. The only survivor was the narrator, who was thrown ashore on an island.

The castaway's first three days were spent in solitude. Exploring the island, he found figs, grapes, onions and other fruit and vegetables, as well as a variety of fish and birds. Soon he encountered the ruler of that bounteous land, an enormous serpent with a beard, a body clad in gold, and eyebrows of lazulite. When the sailor told the serpent the story of his misadventures the latter made him welcome on the island. He showered the sailor with rich gifts—giraffes, ivory, cinnamon and perfumes—and sent him home to Egypt in a ship, saying in farewell: "After you depart from this place you will never see it again, for it will turn into waves."

Although it resembles a fairy-tale the story of the shipwrecked sailor is undoubtedly based on a certain amount of fact. What island in the Red Sea or the Indian Ocean can be identified as the domain of the bearded serpent? Golenishchev thinks it is the Island of Socotra in the Indian Ocean, near the entrance to the Gulf of Aden. Other scholars identify it with the Island of St. John, in the Red Sea; in antiquity believed to have once been inhabited by snakes, or with a small island near Aden which the Arabs call Abu-Haban, meaning "Father of Snakes". The Soviet Egyptologist Y. Maximov, who made the latest translation of the tale into Russian, feels that it is impossible to identify the island precisely, or even approximately, since it "has been endowed with the typical features of a promised land, the paradise of the blessed, to which man has striven in his thoughts since ancient times and has sometimes actually tried to reach".

The inhabitants of Mesopotamia endowed the land of Dilmun with the characteristics of a "promised land". The elements of fantasy do not mean that the island itself was invented. The mention of the island "turning into waves" prompts us to take a somewhat different approach than the one of the Egyptologist or the folklorist. Could the story of the shipwrecked sailor be an echo of the drowning of some actual island or large land mass in the Indian Ocean?

Fabulously rich islands with social systems differing from those prevailing in the ancient world are mentioned in several written records. First of all, Sun Island and the Panhaia Islands in the Indian Ocean. The second book of Diodorus' *Historical Library* describes a man named Jambul whom Ethiopians brought to Sun Island

after four months of sailing through stormy seas. The island was about 5,000 stadia (1,000 kilometres) in circumference. It was situated on the equator, for "the day there was always as long as the night, and not a single object cast a shadow at noon because the sun was in its zenith". The land supplied the inhabitants with everything they needed. They lived to a ripe old age—some of them as long as 150 years—and were never ill. "There was no rivalry among them; they did not experience social discord, for they highly prized internal law and order." The people of Sun Island had a fine knowledge of the "science of the stars". Their writing ran vertically, in columns, from top to bottom.

This last piece of information has led to the hypothesis that Sun Island was Madagascar, since the writing on Madagascar was unique in that the lines went from top to bottom, like in Japanese and Chinese. The German scholar Christian Lassen, however, thought it was the Island of Bali in Indonesia. George Thomson, the English historian, believed the story of the happy island to be simply another utopia, a rather naive tale reflecting some of the rumours about Ceylon that had reached ancient Greece.

The description of Sun Island undoubtedly sounds something like a fairy-tale about a Golden Age and a kingdom of equality and justice. A number of points, though, prompt the thought that this was not merely another mythical island. It is unlikely that such a realistic detail as vertical writing could have been thought up; such a method of writing was unknown to the ancient world. Then, in setting forth Jambul's story, Diodorus was dismayed that Sun Island

had a mild climate although it was situated on the equator; ancient theories about the climate claimed the torrid zone to be uninhabited because of the frightful heat. The mention of a mild climate on a tropical island corresponds to reality. An author wishing to give his tale verisimilitude would hardly have invented a detail so improbable from the viewpoint of the man of antiquity.

Diodorus also describes the three Panhaia Islands discovered in the Indian Ocean by a seafarer named Euhemerus. The islands had many towns, remarkably fertile soil and abounded in game. Diodorus wrote: "The people are warlike and employ war chariots in the old style. Politically they are divided into three groups; priests and artisans, tillers of the soil, and warriors and shepherds. The priests rule in all matters; they settle disputes and guide public affairs.... No one owns any property except his house and garden. Everything that is earned goes to the priests, who divide it all justly, giving each his share. The priests, however, receive twice as much as the others."

While noting that the sober tone in which the islands and their inhabitants are described might appear to be convincing, Professor Thomson thinks it is an invention. He claims that Euhemerus took the picturesque details from all kinds of places he had heard about, including Ceylon.

Most historians of geographical discoveries believe Ceylon to be the place that was known to the Greeks and Romans as Taprobane. But there are many features in the description of Taprobane that do not correspond to what we

know about Ceylon. Taprobane is mentioned in very old sources. Hipparchus noted that no one had as yet circumnavigated Taprobane, so that it might very well have not been an island but "the beginning of another world", the northern edge of the lands of "those living opposite".

Although Ceylon is situated close to India the Greek geographer Strabo said it took seven days to sail from the southern tip of India to Taprobane. Another author of antiquity spoke of twenty days, pointing out that there was a large number of other islands between India and Taprobane, Taprobane being the southernmost land mass. The famous Pliny gave the number of days as four (likewise far too much for the actual distance between India and Ceylon), pointing out that Sun Island stood half way between India and Taprobane.

According to geographers of antiquity, there were 500 towns on Taprobane (ancient Ceylon did not have so many); the area of Taprobane, as described in their writings, is several times that of Ceylon. Pliny said that on Taprobane the shadows fell to the south instead of the north, and the sun rose on the left and set on the right. This means the island was in the Southern Hemisphere. Yet Ceylon is situated roughly between 5° and 9°N!

Pliny cited the accounts related by a freedman named Annius Plokam, who lived in the first century A.D. Not long ago archeologists working on the shore of the Red Sea found inscriptions in Greek and Latin made by freedman Annius Plokam and dating back to the first century A.D.! This might mean that the Taprobane which Plokam visited was not Ceylon but an island

in the Indian Ocean several days' sailing from the coast of India, and now lying at the bottom of the ocean.

The descriptions of fabulously rich islands that are found in the writings of medieval Arab geographers echo the ideas of antiquity. They also include information obtained from daring Arab traders and navigators who sailed the Indian Ocean, as well as details reported by the earliest seafarers of Yemen and South Arabia, who mastered the art of navigation 6,000 years ago.

According to Arab geographers, there were 1,370 islands in the Indian Ocean, and Serendib, as they called Taprobane, was ringed by 59 inhabited islands. They said that Serendib, situated "at the very edge of the Indian Ocean", was almost 5,000 kilometres in circumference, with high mountains and numerous rivers. Rubies and sapphires were mined there.

Does the information furnished by the Arab scholars relate to several thousand years ago or is it merely a reworking of the writings of ancient geographers? Perhaps, despite their fairy-tale, utopian features, the descriptions of the Sumerian Dilmun, of the Egyptian Father of Serpents Island, of Sun Island, the Panhaia Islands and Taprobane by Greek and Roman scholars, and of Serendib by Arab geographers all have a rational kernel. Perhaps they are the people's memory of the rich, inhabited land with which the Tamils, who spoke Dravidian, the language of the proto-Indians, and the Ubaid, and maybe also the Elamites and the Badarians who produced the Egyptian civilisation, linked up their origin. Is the mysterious land mass in the Indian Ocean simply fruit of the imagination, a "prom-

ised land"? Or did this land, so frequently mentioned in so many different sources and among so many different peoples, actually exist? The answer can only be provided by further exploration of the Indian Ocean, until now the least studied of the oceans.

The Least Studied Ocean

The Indian Ocean and its seas have an area of 75,000,000 square kilometres, or about one-fifth of the area of the World Ocean. The first study of the waters and bed relief of the Indian Ocean was made about a century ago by an oceanographic expedition aboard the ship *Challenger*. In 1886 an expedition on board the German ship *Basel* worked in the southern part of the ocean, while another, on board the Russian ship *Vityaz* under Admiral Makarov, conducted extensive surveys in the northern part. Russian, British, German and American expeditions explored the Indian Ocean in the years that followed. However, a multipurpose study began only in 1960, when American, French and Soviet research vessels mapped the main features of the ocean bottom.

The first thing that strikes you on the undersea map is an enormous mountain range, the Mid-Indian Ridge, averaging two and a half kilometres in height. A continuation of two other mid-oceanic ridges, the Atlantic and the South Pacific, the Mid-Indian Ridge stretches from the Arabian Peninsula to Amsterdam Island.

While the Mid-Atlantic Ridge was discovered in the middle of the last century, the contours of the Mid-Indian Ridge were established not

more than a decade or so ago, after the International Geophysical Year programme and detailed studies by an international Indian Ocean expedition that completed its work in 1964.

This is not the only mountainous region on the bottom of the Indian Ocean. The first ridge to be discovered there was the Maldivé, whose peaks, rising above the surface, are the Laccadive, Maldivé and Chagos islands. A few dozen years ago it was believed to be the only ridge in the Indian Ocean. After the contours of the Mid-Indian Ridge were established, the Maldivé Ridge was "joined" to it as one of its parts, along with the Kerguelen Plateau, whose abovewater peaks are Kerguelen Island and Heard Island, topped by an active volcano three kilometres high. But more recent oceanographic research has shown that the Maldivé Ridge ends at the Tropic of Capricorn and bears no relation to the Mid-Indian Ridge. Neither does the Kerguelen Plateau. Both are independent underwater mountainous regions.

Another submarine range, starting in the Bay of Bengal, was discovered only recently and has been named the East Indian Ridge. A spur at its southern end, running towards Australia, is known as the West Australian Ridge. Still another newly-discovered underwater range is the Lanka Ridge, situated a thousand kilometres from Ceylon. Soviet scientists aboard the research ship *Vityaz* found a big underwater mountain which they named Mt Afanasy Nikitin in honour of a 16th century traveller who was the first Russian to visit India. Perhaps the most interesting discovery, though, from the viewpoint of the present book, is that of a micro-continent in the Indian Ocean.

Oceanographers have given the name "micro-continent" to an elevation isolated from a continent but whose structure is nevertheless similar to the structure of the continent. New Zealand and the floor of an extensive area east of it in the Pacific are known as a micro-continent. The underwater Kerguelen Plateau and Kerguelen Island in the antarctic section of the Indian Ocean may also be called a micro-continent. In the northwestern section of the Indian Ocean there is another micro-continent, the Seychelles, which includes the Seychelles Islands and the northern part of the underwater Mascarene Ridge (shaped like an arc bulging to the east); in the north the abovewater top of the ridge forms the Seychelles Islands and in the south the Mascarene Islands.

Most of the Seychelles Islands are of granite believed to be 650 million years old. The really remarkable thing, though, is that the continental crust both on the islands themselves and in the adjoining underwater regions is not connected with the submarine fringe of the African continent. In other words, the Seychelles micro-continent is not a fragment of Africa but is an independent geological formation. Could it be the remains of Gondwanaland? Or are the Seychelles Islands the last remnants of Lemuria? But if so, why have no traces of an early civilisation been found there?

Oceanographers may be right when they say that this portion of the Indian Ocean is an ancient area in transition and has not yet completed its development. That is, the Seychelles micro-continent is not a region which has subsided but, on the contrary, a portion of the ocean floor which has not yet risen to the surface. Neither a posi-

tive nor negative answer can yet be given to this question. We shall have to wait and see what is revealed by further geophysical and oceanographic studies of the Indian Ocean, now only in their initial stage.

Oceanographers, geologists and geophysicists are devoting their closest attention to the north-western section of the Indian Ocean, which has the most complex relief and where the earth's crust is still in motion, as evidenced by volcanic eruptions and earthquakes. Many of them believe that this part of the ocean has developed differently from all the other sections. The granite massifs of East Africa, the Arabian Peninsula and the Indian subcontinent continue out into the Indian Ocean.

Zoologists have long since noted the remarkable similarity between the animal worlds of Madagascar and the Indian subcontinent. Wegener and other supporters of the theory of continental drift think that Madagascar and India were once situated side by side as parts of a single parent continent, Gondwanaland. Others believe that India and Madagascar were once connected by a land bridge, Lemuria.

Lemuria, they say, began to subside long before *Homo sapiens* appeared on the scene. It must have been a slow process as one section of land disappeared after another beneath the waves. First the continuous solid arc between Madagascar and the Indian subcontinent was broken, and then individual islands and islets, the remnants of Lemuria, started to sink. The subsidence may still have been going on until recent times, geologically speaking, possibly within the memory of man.

Is the origin of two of our earliest civilisations,

the proto-Indian and the Mesopotamian, connected with "geological Lemuria"? If so, in what way? What is the relation between the Lemuria spoken of by medieval Tamil writers and the hypothetical country that once connected Madagascar with India? Why do authors of antiquity claim that India and Africa were once connected by a land bridge? We ourselves learned of this fairly recently, through advances in geology and oceanography, sciences about which the Greeks and the Romans knew nothing. Numerous islands in the Indian Ocean are repeatedly mentioned by geographers of antiquity and Arab geographers but have not been identified with any of the known islands in the Indian Ocean. Are they the last remnants of Lemuria, now at the bottom of the ocean?

Is there any factual basis for the legends about an underwater castle "in the depths of the Green Waters" that have been recorded among the Malagasy who live in the environs of Diégo-Suarez, a harbour and town near the northern end of Madagascar?

How can the affinities which several linguists have found between the Dravidian languages and a number of languages spoken in East Africa be explained?

Did the original home of the Dravidians sink to the bottom of the Indian Ocean, as Tamil authors maintain? Did the proto-Dravidians migrate to the shores of Africa, as well as northwards, to the shores of India and the Persian Gulf? All that is possible, for the origin of many ancient East African civilisations, with their towns and ports, is still a mystery to archeologists and historians.

The Fall of Mohenjo-Daro

Those are questions which only underwater archeology can answer. Near the city of Trincomalee, in the warm waters that wash Ceylon, scuba divers have found sunken monuments of various civilisations. It is quite possible that underwater archeologists may discover the capital of the proto-Indian civilisation. About 100 towns and settlements relating to India's earliest culture are now known to science. The two largest, Mohenjo-Daro and Harappa, on the banks of the Indus, are about equal in size and in other features. Does this mean that the real capital has not yet been found? Does it mean the capital should be sought not on land but under water?

Near the delta of the Indus there is a broad coastal shelf lying at a depth of roughly one hundred metres. It is almost as wide as the vast delta of the Indus, and a submarine canyon runs through it, showing that the Indus must have been much longer than it is today. This area may have sunk to the ocean floor within a very brief period, as a result of an earthquake. Such things have happened several times in that area.

Authors of antiquity speak of natural calamities in the Indus Valley. Strabo, the Greek geographer, cites, in his *Geography*, the evidence of Aristobulus, who says that he found, while on a mission, a country of more than 1,000 towns and localities, which had been abandoned by its inhabitants because the Indus had swerved away from its channel and turned left into a much deeper channel, through which it rushed like a cataract. Many centuries later scientists confirmed this.

The chief confirmation has come not from archeologists but from a team of hydrologists and geologists under the American researcher D. Rakes. They have established that a site 140 kilometres south of Mohenjo-Daro was once the epicentre of a gigantic earthquake which transformed that part of the Indus Valley beyond recognition. The tremors threw up piles of rock that blocked the mighty Indus and forced it to retreat. Torrents of mud turned the river into a shallow, swampy lake which inundated the valley. The numerous communities near Mohenjo-Daro were buried beneath a layer of sand and silt many metres deep.

Mohenjo-Daro was flooded more than five times, yet it rose from its ruins again and again. Each onslaught by the sea of mud must have lasted about 100 years, scientists say. A recently discovered stone dam more than ten metres high and twenty metres wide gives an idea of how the proto-Indians countered the forces of nature. Elemental disasters were the reason why the proto-Indian civilisation perished, say Pakistani archeologists and scientists from the University of Pennsylvania in the United States. Since proto-Indians had to devote all their energies to battling with the elements they were unable to stand up to pressure from the nomads. Their civilisation declined and disintegrated.

The structure of the ruins of Lothal, the oldest port in the world, found by Indian archeologists on the Kathiawar Peninsula, not far from present-day Bombay, is remarkably similar to the structure of Mohenjo-Daro, although Lothal is much smaller, once being known as "Mohenjo-Daro in miniature". Underwater exploration may bring to light "greater Mohenjo-Daro", capital of the

proto-Indian civilisation, which once stood on the coast of the Indian Ocean. It will probably be the same type of city as Mohenjo-Daro—well laid out, with broad streets, a sewage system and the like—but larger.

When and where the proto-Indian civilisation originated is not yet clear, as we have said. Nor do we know with what still earlier civilisation it was connected. The destruction of the mysterious civilisation on the Indian subcontinent also calls forth many hypotheses and controversies. When did the collapse occur, and why? The American scientist Rakes and those who share his views believe that a colossal disaster must have swept the civilisation away. Others think the cause was a breakdown in the irrigation system and exhaustion of the soil. Still others presume that the proto-Indian civilisation was wiped off the face of the earth by an invasion of warlike nomad Aryans. Some seek an internal cause, maintaining that the fall of Mohenjo-Daro and other cities was rooted in the slave-holding system and its incurable evils.

Future investigations, including underwater archeological research, will show which of these assumptions is correct. Researchers in diving suits will test the truth of the Indian legends about drowned cities and temples.

According to these legends, Dwarka, one of the seven sacred cities of ancient India, was situated in what is now the Bombay area, and was swallowed up by the ocean seven days after the death of Krishna, the incarnation of the great god Vishnu. On the Bay of Bengal, 80 kilometres south of Madras, stands the ancient Dravidian seaport of Mahabalipuram, famous two thousand years ago for its size; ships from all over the

world anchored there. Monoliths, caves and temples of granite, and magnificent statues carved on granite hillsides have made Mahabalipuram famous in the history of world art. For centuries waves have beaten against the beautiful Mahabalipuram temple that stands on the edge of the Bay of Bengal, destroying the buildings around the temple and covering them with sand. Legends say that another six temples stood beside this temple, but they have all been swallowed up by the waves.

Will the legends be confirmed? Will underwater exploration bring new monuments of India's ancient culture to light? Perhaps archeologists will have the good fortune to find traces of an earlier civilisation, the proto-Indian. Or perhaps the floor of the Indian Ocean contains traces of a still earlier culture, preceding the proto-Indian.

Deities of the Proto-Indians

Regardless of what caused the decline of the proto-Indian culture, it is clear to modern historians that many of its achievements were adopted by its successors, the warlike Aryan nomad tribes which appeared on the scene in the middle of the second millennium B.C. These included the cultivation of wheat, barley, peas, flax and cotton; cultivation of the date palm; pottery; sewage systems and town planning; domestication of the zebu, an Asiatic breed of humped cattle, and the elephant; the principles of agriculture and shipbuilding.

It was natural that the Aryans also borrowed a great many intellectual values from the proto-

Indians. Decimal numeration was invented in India—not by the Aryans but by the proto-Indians, whose merchants and mathematicians were using it several dozen centuries before the Aryan invasion. There is no doubt that the religion and mythology of the proto-Indians influenced the religion of the Aryan conquerors.

True, this was a complicated process. The first period in the history of Aryan India was marked by the undivided rule of Brahman priests who called themselves living gods and stood above the rulers, including the most powerful kings. The conquered peoples continued to adhere to their religious beliefs in secret. But a far-reaching spiritual crisis in the sixth century B.C. brought these beliefs out into the open, and they lay at the foundation of three new religions, Buddhism, Hinduism and Jainism, which replaced Brahmanism.

The earliest Aryan literary monument, the *Rig-Veda*, lists a large number of gods, personifications of the wind, water, fire, storm clouds, drought and other elements. Later, Brahman scholars proclaimed Brahma, the ultimate creator of all being, to be the supreme deity. In Hinduism, Brahma is only an amorphous creator, while Vishnu and Siva are in the forefront. Siva, especially revered among the Dravidians of South India, was called "the god that has engulfed the universe", a "luminary beyond the cognition of Brahma and Vishnu", the "god of gods", the "First", the "creator of the Vedas" (a collection of Hindu sacred writings), the "chief god of the immortals", and so on and so forth. Siva was set apart from the rest of the gods in the vast pantheon of the sacred Vedas, and was called "he who stands alone".

Indologists believe that the Siva cult absorbed a large number of the ancient cults which existed among the population of the Indian subcontinent before the arrival of the tribes of nomad Aryans who created the Vedic hymns and gods. Excavations of proto-Indian towns have shown that the worshippers of Siva were right in considering their god "older than the Vedas", for the proto-Indians worshipped a deity that was undoubtedly Siva's prototype.

Probably the most interesting portrait found on proto-Indian seals is that of a multifaced deity surrounded by animals. The god is seated on a throne with his legs crossed in a yoga posture, which means that yoga was practised in India long before Patanjali, known as the Father of Yoga, and that the epithet "Yogeswara" or Lord of the Yogi, which the followers of Siva bestowed on their god, was justified. The arms of the deity are hung with bracelets, and he wears a fantastic, fan-shaped headdress crowned with buffalo horns. He is surrounded by an elephant, a tigress, two antelopes, a rhinoceros and a buffalo.

John Marshall, the British archeologist who led the team excavating Mohenjo-Daro, established that the figure of the deity was a representation of Siva in the aspect of Pasupati, "Ruler of the Beasts". It has long been assumed that the Siva cult is one of the oldest in India, going back to prehistoric times, and the above interpretation of the figure on the amulet-seal confirms this. It should not be thought, however, that the deity worshipped by people of the Harappa culture (that is, the proto-Indians) was also called Siva. Siva is merely one of the names by which this deity is known in our day. Siva has more than a thousand names, they say, the

majority of which reflect his different functions.

Siva's wife, considered the female embodiment of this ubiquitous god, has just as many names. She is worshipped in all kinds of places in India and in the most diverse aspects, from the gracious beauty Uma to the savage destroyer Kali, who wears a garland and wreath of human skulls. The cult of this Mahadeva (Great Goddess) can be traced back to the matriarchate, in the deepest antiquity. It was widespread among the proto-Indians, as we can see from drawings on seals from Mohenjo-Daro and other cities. An analysis of hieroglyphic inscriptions left by the proto-Indians indicates that the husband and wife, the "proto-Siva" and the "Great Goddess", were the supreme deities in the proto-Indian pantheon.

In a small pamphlet published in 1965 in which he analyses the hieroglyphics and other historical records, the Indian scholar Radj Mohan Nath draws the conclusion that the sign of the trident (with five prongs instead of three) combined with the sign of the fish conveys the title of the chief god Siva, called the "Maha Machli" or "Great Fish". Soviet scholars reached the same conclusion, independently of Radj Mohan Nath, in the same year, using statistical methods. According to the theory of probability, a combination of these signs should occur by chance only two or three times in the proto-Indian texts. Actually, they have been found 58 times, which means the combination is a set expression, evidently some sort of title or appellation.

The five-pronged trident is found together with a sign representing a female figure. This also seems to be a set combination, for it has

been met with several dozen times, although according to the theory of probability it should occur only once or twice. "Mahadeva", meaning "Great Goddess", the wife of Siva, is a common appellation. Most probably, the five-pronged trident conveys the meaning of "great", and combined with the picture of a fish or a woman signifies the title "Great Fish" and "Great Woman" (or "Great Goddess"), the titles of the supreme deities of the proto-Indians.

Proto-Indian texts have been deciphered by computer by a team of Finnish researchers, who in 1969 reported on their work in a paper that shares the conclusions reached by Soviet researchers. The Finnish scientists did not know about Radj Nath's pamphlet, nor had they seen publications about the Soviet studies. Yet all three teams of scientists have arrived at the conclusion that the proto-Indian texts contain the names "Great Fish" and "Great Goddess". The names, of course, were not Maha Machli and Mahadeva, which names are Sanskrit loan translations from the proto-Indian.

The Secrets of Tantra

Very few proto-Indian texts have come down to us, and it is unlikely that we would learn much of value about the origin of the proto-Indian civilisation from them, even if we should succeed in deciphering them. However, many proto-Indian riddles can be solved by studying other written records, the Tantric scriptures.

The word "tantra" means, literally, "fabric", "interlacement" or "warp". The Tantric symbols and drawings discovered in India date back to the Paleolithic period. The Tantric scriptures

may have been developed and systematised by proto-Indian priests, for a large number of proto-Indian signs and symbols are identical with the Tantric. Siva and his wife, the "Great Goddess", are the supreme deities of the Tantrists, as they probably were of the proto-Indians. Tantric scriptures are held to be "older than the Vedas". They emerged, says the Tantric teaching, from the "main" lips of the great Siva and hence are the "Fifth Veda". The Brahmans, the Aryan priests, idolised the four Veda collections. The "Fifth Veda" is not Aryan but probably proto-Indian in origin.

Unfortunately, far from all the Tantric scriptures in India have come down to us. Many have been lost, and only fragments of others have survived. The Moslem conquest of Northern and Central India likewise substantially depleted the "Tantric library". Paradoxically, the key to Indian Tantrism (and possibly to the proto-Indian mystery itself) has to be sought outside India, in the Himalayas, Tibet and Central Asia. There, a great number of compositions by Indian Tantrists have been preserved in "Buddhist garb", in translations into the Tibetan language. While only several score Tantric scriptures written in Sanskrit have come down to us, the Buddhist canon *Kangur*, written in Sanskrit, which exists only in Tibetan translations, contains about a thousand Tantric scriptures attributed to Buddha. The number in the *Tangur*, a collection of commentaries on the teaching of Buddha, exceeds three thousand. The overwhelming majority of the authors of the *Tangur* are Indian Tantrists.

Buddhists and other scholars in many countries have not yet reached a unanimous opinion

on what the original teaching of the deified Gautama Buddha, the Shakya Muni, represented. Was it purely religious or was it moral and ethical? Was Buddha himself an historical personage like Mohammed, the Moslem prophet, or was he a mythical figure, like Osiris, the Egyptian god?

Several centuries after Buddha's death his teaching split into three doctrines, three "vehicles", three paths which have to be followed if man is to transcend suffering and attain nirvana, the final beatitude. The Hinayana, or Little Vehicle, spread through South-East Asia, and millions of people in Burma, Laos, Cambodia, Thailand, Ceylon and South Vietnam profess this earlier form of Buddhism. The Mahayana, or Great Vehicle, first spread into Central Asia (Soviet archeologists have found the ruins of Buddhist temples there) and then into China, Japan, Korea, Nepal, Tibet, Mongolia and the Buryat and Kalmyk areas. From the Mahayana there later branched off the Tantra Vehicle, whose exponents, the Siddhi, or those who have attained perfection, showed their followers the shortest and quickest way to attain nirvana.

Although Buddhist Tantrism was born in India, all three "vehicles of Buddha" abandoned their homeland after the Moslems conquered a large portion of the Indian subcontinent. Today, Buddhist monuments in India are studied through archeological excavations. But scholars can still study the traditions and teaching of Tantra under "natural conditions", in the small principalities of Sikkim and Bhutan on the slopes of the Himalayas, for the Indian sage Padma-Sambhava brought Tantrism to the Himalayas in the eighth century.

Until the mid-sixties of the present century splendid works of art and philosophical thought connected with Tantrism were unknown to the world. Just recently a book on Himalayan art by the Indian art scholar M. Singh appeared under UNESCO sponsorship. Assistance from the governments of Nepal and India, and the co-operation of the Dalai Lama, Buddhist leaders preaching Mahayana, and the local authorities of Sikkim and Bhutan enabled Singh to visit the most outlying monasteries and introduce the world to masterpieces whose reproduction had been strictly forbidden. Now it is the turn of philologists, historians and philosophers. The Tantra scriptures represent a rich field for study. Perhaps they will help to solve the mystery of Lemuria, where the Tantric teaching may have arisen, been developed by the proto-Indians, and then carried up above the clouds into the Himalayas.

Soviet scholars do not, however, have to take up mountain-climbing and scale Himalayan peaks in order to study Tantric scriptures. Tantrism was still being taught at monasteries—also a type of medieval university—in the Buryat country, on the territory of the Soviet Union, at the beginning of this century. There are many Tantric scriptures in libraries in Leningrad and Ulan Ude, and their analysis is producing astounding results.

In 1968 the Buryat Branch of the Siberian Department of the USSR Academy of Sciences published its third collection of articles on the history and philology of Central Asia. An article on Buddhist cosmology, contributed by R. Purbayev, noted that besides the traditional doctrine of the world (which does not differ much

from the doctrine of a world resting "on three elephants") Buddhism, particularly Tantric Buddhism, had another view maintaining, for one thing, that our planet was a sphere rotating around its axis. One cannot but agree with the author of the article that this is of undoubted scientific interest.

It is to be hoped that, in addition to exploration of the floor of the Indian Ocean, a field of research so far removed from oceanography as the translation and study of Tantric scriptures will help to throw light on the riddle of Lemuria. (Incidentally, Buddhism believes that man is descended from the apes and that he developed into *Homo sapiens* on the territory of India, that is, in the region where the earliest remains of man's ancestors have been found.)

From the Buryat Area to Australia

Lemuria, as we see, is connected with sciences that range from marine geology to the deciphering of ancient scripts, and, geographically, from the Indian Ocean to the Himalayan Mountains and the Buryat steppes. It may be that Australia and Australian studies are also linked up with Lemuria.

The first students of Australia were struck by the similarity between the Australian aborigines and the dark-skinned Dravidians. How could the likeness be explained? The forefathers of the aborigines could not have migrated from India to Australia across the Indian Ocean in fragile boats or on rafts. A hypothesis claimed that since the Australians are not listed among the peoples descended from the sons of Noah they, like the American Indians, were created by God separa-

tely—the Australians in Australia, the Red Indians in the New World—and were settled for good on those lands. Such an explanation did not, naturally, satisfy the scientists. “The theory that man existed before Adam was invented with the aim of refuting the idea of the fraternity of all races and to justify the crimes of the colonialists,” says V. Kabo, a Soviet expert on Australia.

Anthropologists and ethnographers are still carrying on a heated debate about the Dravidian and Australian similarities. Some find them merely superficial, others believe the Australians are the original stock, and still others think that the Indian subcontinent was the birthplace of the Australians. The relation between the Dravidian and Australian languages is also still open to debate. As far back as in 1847 the Australian scholar J.C. Prichard argued that there is a kinship between the Australian languages and the Tamil languages. About a century ago another Australian scholar, William Bleek, showed that the Australian and Dravidian languages have a similar structure. Since then, much has been written about this. A monograph published in 1963, *On the History and Structure of the Australian Languages*, by N. M. Holmer of Lund, Sweden, shows how the grammar and phonetics of the Dravidian and Australian languages coincide.

But this does not provide sufficient grounds for asserting that the languages are related. The coincidences may be purely superficial. Linguistic and anthropological data are not enough to assert, or deny, that the Australians and Dravidians are related. What do the archeologists say? Excavations carried out in recent years in Australia, India, Pakistan and Ceylon have enabled

scientists to study many Stone Age cultures, and have revealed an indisputable resemblance between Australian and Hindustani stone implements. Once again the same question arises: does this resemblance mean there is a relationship or is it purely coincidental? Here ethnography, sister of archeology, comes to our aid. Every schoolboy knows that the boomerang is one of the most typical attributes of Australian culture. Yet few people besides ethnographers know that at the end of the last century the boomerang was found among the tribes of Southern India, and that these tribes spoke languages belonging to the Dravidian family!

Where, then, was the original home of the Dravidians and the Australians? Although not a single discipline has enough facts as yet to declare with certainty that these peoples are related, all the sciences dealing with man—ethnography, archeology, linguistics, and anthropology—possess facts that indicate they had a common land of origin. Information gleaned from different sciences combines to provide fairly convincing evidence that these peoples now separated by the Indian Ocean were once related. Consequently, it is only natural to ask where the common cradle of the inhabitants of Southern India, Ceylon and Australia was situated.

Few scholars nowadays believe that Australia was the birthplace of the Dravidians, to say nothing of man in general, as some anthropologists maintained at the beginning of this century. Most now think that the Australians originated in the Old World, or rather, in Asia; to be more precise, in the countries that lie south of the Himalayas.

But could this "South Asian centre" have been

preceded by a still more ancient centre that now lies on the floor of the Indian Ocean?

In 1931 the eminent Soviet ethnographer A. Zolotaryov used oceanographic and geological data in an attempt to solve the "Australian riddle". There is a resemblance between the inhabitants of Southern India and Australia, he said, because the Indian subcontinent and Australia were at one time much closer to each other but later the continents drifted apart, until the Indian Ocean lay between the Australians and the Dravidians. Zolotaryov based his deductions on Wegener's theory, which was then popular.

But the opposite hypothesis, also oceanographic and ethnical, may prove to be the correct one. According to this hypothesis, until the end of the Ice Age there were land bridges between India and Australia that enabled tribes of primitive man to communicate. Such bridges could explain why the Dravidian and Australian languages are cognate. They would also explain other relationships that anthropology, ethnography and archeology have discovered. Help in solving the problems which these sciences face may come from oceanography and marine geology, which are now concentrating on a study of the Indian Ocean.

Pages from "Chronicles on Rock"

Researchers are employing anthropology, ethnography, linguistics and archeology in their efforts to solve the Australian riddle. But they still lack the most reliable type of information to help them reconstruct the ancient history of the Australian continent; they do not have the written sources with which historians who study

antiquity are used to dealing. Yet although writing appeared in Australia only after the arrival of Europeans, there is a large number of sources left by the Australians that help to shed light on their ancient history. We refer to the thousands of pictures on rocks found all over Australia. To decipher them is one of the hardest and most fascinating jobs a student of Australia can undertake. Here, too, as in everything else concerning the ancient history of Australia, much is hazy, hypothetical and debatable.

First, the age of the drawings. Some scholars believe them to be no more than 150 to 200 years old. Others are inclined to think they date back tens of thousands of years, since there are drawings of extinct animals like giant reptiles and giant marsupials such as the Diprotodon, a rabbit that was the size of a rhinoceros.

Secondly, it is not clear what most of the drawings mean. We do not know the traditions and myths that would help to explain who and what are represented by the enigmatic half-men, half-beasts, roughly outlined figures and geometrical symbols that were the favourite subjects of Australian aboriginal artists.

Thirdly, there is an amazing similarity between the styles of some Australian drawings and those of the pictorial art of other peoples. One Australian style is similar to that of the bushmen of South Africa, another resembles the style of the rock drawings done in Egypt before the time of the Pharaohs, and still another style is similar to that of the Spanish cave paintings of the Stone Age. Is this just a superficial resemblance, or is it something more? There is no unanimous opinion.

The most heated debates have centred round

the Wondjina pictures, the best-known rock drawings in Australia. They were discovered by George Grey, an early explorer of Australia, in 1838, in the depths of the Kimberley caves in Northwestern Australia. The drawings depict fantastic creatures with nimbuses about their heads, white faces, no mouths, and bodies covered with long vertical stripes. More pictures of those strange creatures, whom the aborigines call Wondjinas, were found in Australia later.

Grey believed the drawings to be the work of an alien people, probably Malays. Other scholars thought the Wondjina drawings represent ancient Sumerians or Babylonians, Egyptians, Africans, or Greeks. In the present century the Australian ethnographer Elkin produced weighty evidence that the drawings are the work of Australian aborigines, for they still worship the figures in the drawings, touch them up in periods of drought, and believe that the Wondjina heroes rule over water and rain.

Another hypothesis which has appeared in this century maintains that the nimbuses around the heads are stylised depictions of the helmets of astronauts. According to this hypothesis, creatures from outer space are also portrayed in the Tassili frescoes in the Sahara Desert.

This seems farfetched, while Professor Elkin's hypothesis sounds convincing. Still, it is a hypothesis, not a proven fact. In the mythology of primitive peoples there are dozens of examples of newcomers, standing at a higher cultural level, who became the objects of a cult and were worshipped. (The Europeans who came to Australia were taken to be either the spirits of the deceased or gods.) The connection between the Wondjina drawings and water brings to mind

the expanses of the Indian Ocean and Lemuria, which may have drowned in its depths.

Australian legends and myths speak of "ancestors" to whom the aborigines owed their cultural achievements. The mythical "ancestors" or fantastic beings who gave the aborigines weapons and implements came from the north or the north-west, that is, from the direction of the Indian Ocean.

Legends about other people who once inhabited the country are widespread among Australian tribes. Usually they are represented as dwarfs to whom, in some parts of Australia, the cave drawings are attributed. Soviet scholar Kabo thinks the legends are an attempt by contemporary Australians (as well as Polynesians and other peoples) to explain the origin of monumental works of art, structures and so on whose creators are unknown to them.

Who produced the mysterious works that scholars have been trying to decipher for the past century and a half? Were they Australians? Or were they newcomers? Although the first specimens of the remarkable art of Australia were discovered many years ago, their study is just beginning. Not even the most famous of the "picture galleries" have been studied in depth. Here is a typical example. Unique drawings of life-size human figures totally different in appearance from the Australians were found on the Arnhem Land Peninsula at the end of last century. They are reminiscent of paintings in the temples of ancient Egypt, says George Bradshaw, who discovered the drawings.

It was really a unique find, yet the drawings have not been visited since! Australia's cave art is just as unknown to art scholars as the

Indian Ocean, whose floor may provide the key to the mysterious drawings, is unknown to oceanographers.

Australian mythology says that the Wondjinas came from the west or the north-west. What is more, they "emerged from the sea". It is significant that the aborigines attribute the prehistoric megalithic monuments to the Wondjinas. John G. Withnell, an ethnographer who wrote a description of the tribes of Northwestern Australia at the beginning of the present century, learned from the local inhabitants that those megalithic monuments, like the rock drawings of Wondjina heroes, were intended to help to increase the number of children, birds, animals, insects, reptiles, fish and plants. It is possible that the Wondjinas were idolised men who came from the north or the north-west and who built the stone monuments. Later, as has happened repeatedly in other cases, they were worshipped by the Australians and became personages in myths connected with reproduction and fertility rituals (here water is the source of life and vegetation). Prehistoric megalithic structures are found not only in the Kimberley district but also in other parts of Australia. As a rule, they are near the coast of a sea or the ocean. They are similar to megalithic structures on the Melanesian islands, whose origin is likewise unknown.

According to Thor Heyerdahl's widely known hypothesis, the large stone structures and stone statues in the eastern part of Oceania (Easter Island, the Marquesas Islands, etc.) and the technique of building them spread from east to west, from the coast of South America to Easter Island, and then farther west, to the other Polynesian islands. (The Easter Island statues are

younger than the monuments of ancient Peru and Bolivia but are older than the stone statues on other East Polynesian islands.)

At the other end of the Pacific the situation was different. Here a people about whom nothing is known moved from west to east. This people must have built the megalithic structures on the Australian coast, the mysterious statues and stone objects which archeologists have found on New Guinea and about which the local inhabitants know nothing, and the stone monuments on the Melanesian islands. Were these men the ancestors of the modern Polynesians, as some scholars think? Or did they come from India, from Mesopotamia, or from the Egypt of the Pharaohs? Did they vanish without a trace? We do not, as yet, have answers to these questions. Therefore, the hypothesis that those men lived in Lemuria, a land that drowned in the Indian Ocean, has as much right to exist as the other hypotheses, although there are many objections to it, as there are to the other assumptions concerning the origin of the stone monuments of Oceania.

The megalithic structures are perhaps one of the most complex and fascinating riddles in the prehistory of man. Megalithic structures are found everywhere: in England, Southern India, Spain, the New Hebrides, Australia and the Caucasus. And everywhere they stand in coastal areas, the largest and most impressive being closest to the shore. Does that mean the monuments were erected by a seafaring people? Should all the monuments be regarded as being the work of one and the same people? Perhaps, though, the undoubted similarity of the megalithic structures reflects a similarity of general architectural principles.

Some scholars believe the idea of megalithic structures spread from west to east, from the Atlantic to the Caucasus, Southern India, Australia and Oceania. Others (true, a minority) hold that they were first built on islands in Oceania and then spread westward. Still others think that there is no single chain of megalithic structures, that Europe, India, Australia and Oceania each had its own local centres, unrelated to the others.

Who is right? We do not know. Some hypotheses are more convincing than others. With the present level of archeology, ethnography, anthropology and other sciences, none of them can be proven. Only after the floor of the Indian Ocean has been thoroughly explored will we be able to say anything definite about the Lemuria hypothesis and then go on to answer the questions of who settled Australia, where the proto-Indian civilisation originated, where the birthplace of man was, and so on.

Did Antarctica Drift Away?

A study of the bottom of the Indian Ocean and its seas may lead us to reconsider many questions connected with the origin of man and the earliest civilisations. On the other hand, it may show that Lemuria, remnants of Gondwanaland and other sunken lands and islands never actually existed in the Indian Ocean, that a vast continent simply disintegrated to form the Indian sub-continent, Africa, Australia, South America and Antarctica.

In the view of the new advocates of the continental drift theory, the global system of mid-oceanic ridges and rises is a result of stretching

of the earth's crust in the axial zone of the oceans between the parts of the original continents after they moved apart. Geophysicists are now conducting investigations that should show whether continents are still drifting and forming "oceans in embryo". They are pinning their biggest hopes on a study of the rifts of the Mid-Indian Ridge, for these continue on land in Arabia, Palestine, Somalia and Kenya.

One of the rifts runs due north up to the basalt plateaus of the Deccan Peninsula. Another turns north-west to the Red Sea. In the Gulf of Aden it splits up, one fracture running along the floor of the Red Sea to emerge on land as the valley of the Jordan River, the other reaching Somalia and forming a rift valley in East Africa. Advocates of the continental drift theory believe that this is where two oceans of the future will be formed: several million years from now the African continent will be cut by another long, narrow sea, and meanwhile the Red Sea will have grown much broader and turned into an ocean separating Arabia from Africa.

The formation of the Red Sea, according to supporters of the continental drift theory, took place only 10,000,000 or, at most, 20,000,000 years ago. Arabia began to drift away from Africa towards the north-east, at the same time making a counterclockwise turn. Today the Red Sea is growing broader at a rate of some one and a half centimetres a year, they say. In the near future more sophisticated instruments will enable this displacement of the earth's crust to be recorded.

If the theory is right and the continents really do "float" on the mantle, at what rate are they moving? Some scientists assume that the movement was very slow in all periods of time and

that it would have taken from 150,000,000 to 200,000,000 years for the sections of Gondwanaland to drift to their present positions. But according to more recent hypotheses our planet is expanding and this is what sets the continents adrift. The drift is believed to be considerable, so that not so long ago, at least within human times, the portions of Gondwanaland were much closer to one another than they are today.

An interesting sidelight is a report by American cartographers that they found the Antarctic continent on two 16th century maps; moreover, on one of the maps the coastline coincides to an amazing degree with the contours of Antarctica that were determined only recently by the latest geophysical instruments.

The existence of coal strata and other facts tell us that once upon a time the climate of Antarctica was much warmer and the continent did not have an ice cap. That was at least 200,000,000 to 250,000,000 years ago. We do not know when the antarctic region became covered with ice. Some glaciologists think it could not have been more than nine or ten thousand years ago. Astonishingly, though, the 16th century maps mentioned above show the coast to be free of ice.

One of the maps was compiled in 1513 by the Turkish admiral Piri Reis, who noted that he had consulted maps compiled in the fourth century B. C. Many scholars in ancient times believed that there was an unknown land in the Southern Hemisphere and that it was a sort of "counter-balance" to Europe, Asia and Africa in the Northern Hemisphere. Did the geographers of antiquity base themselves on actual facts or was this Terra Incognita Australis, or Unknown Southern Land, a purely theoretical idea?

Until Cook's voyages at the end of the 18th century the armchair geographers of Europe were certain of the existence of Terra Incognita Australis; they placed its area at 180,000,000 square kilometres (Antarctica covers a little more than 13,000,000 square kilometres and Australia 7,700,000 square kilometres), believing it to be larger than all the civilised parts of Asia from Turkey to the eastern extremity of China and to have a population of 50,000,000.

The second map, drawn by Orontius Fineus in 1531, shows antarctic mountain ranges and rivers about which we have learned only in the 20th century. Is this merely coincidence? Did Fineus, like Piri Reis, use ancient source material? Or did the geographers of antiquity rely on still earlier information obtained from the Egyptians, Indians and Arabs, the great navigators of the ancient world? Or did there, as some scholars believe, exist an unknown civilisation whose centre was Antarctica? Or can the maps be traced back to maps compiled by beings from outer space who visited our planet several thousand years ago? Or are Soviet geographers right when they say that the surprising resemblance between Antarctica and the Unknown Southern Land on the maps of Piri Reis and Orontius Fineus is the result of an incorrect reading of the maps to make them fit a preconceived notion?

The mystery of the old maps still has to be solved, and so do many other interesting puzzles which the sciences about the earth as well as the sciences about man may help to untangle. Among them is the riddle of the numerous islands in the Atlantic Ocean that are found on medieval maps but do not exist today.

Part Three

THE ATLANTIC OCEAN



Legendary Islands

Old maps of the Atlantic Ocean contain the names of many islands not to be found on modern maps, among them St. Brendan's, Brazil, Antilia, or Island of the Seven Cities, and Virgin Island. "There are 150 distant islands in the ocean west of us, and each is two or three times larger than Ireland," declares an inscription on one map.

Historians of geographical discoveries have gone to great lengths to decipher medieval maps and the names of their mysterious islands. Many of the names undoubtedly correspond to actual islands, for example, the Canary Islands, the Azores, Madeira. Some scholars believe that medieval navigators reached America and the West Indies and that their discoveries were recorded on the maps under the names Antilia, Brazil and Virgin. Most historians, however, support the opposite view; as Europeans moved across the Atlantic, the legendary islands "migrated" westward on the maps, and after Columbus discovered America and the route to the New World had been opened, old names were given to new lands: the Antilles, Brazil, the Virgin Islands.

Many island names on medieval maps are a result of errors. The legendary island discovered by the seafaring Abbot Brendan "gave birth" to an island named Borondon. The island of Brazil appeared first in the northwestern part of the Atlantic, then in the central part, and finally in the southern part, along the European coast; in fact, some maps have three different Brazil islands. There are islands that owe their origin to ancient and Arab cartographers. Ogygia, for instance, where a sea nymph, Calypso, was supposed, in Homer's *Odyssey*, to have kept Ulyss-

es a captive, was turned, in the Middle Ages, into Devil's Island and then into Virgin Island, and finally gave its name to the Virgin Islands in the West Indies.

Although medieval maps have been searchingly examined and interpreted, they still contain islands that are a riddle. Neither errors on the part of cartographers, information about actual islands in the Atlantic, nor distortions by Arab or ancient sources can explain them. On the other hand, even distortions must have some sort of explanation. Ancient scholars did not spin those islands out of thin air. They must have used information obtained from Greek and Roman mariners who sailed in the Atlantic.

Nor were Greeks and Romans the only ones who provided the information. There were probably still more skilful navigators among the other Mediterranean peoples, such as the Etruscans of Italy, the Carians and Lycians, who lived along the coast of Asia Minor, and particularly the Phoenicians and Cretans.

Bold Phoenician mariners sailed around the southern tip of the African continent, something Europeans attempted only 2,000 years later. They were completely at home in the Mediterranean and they ventured out into the Atlantic. A clay vessel filled with coins minted by the Phoenician colony of Carthage in approximately 325 B.C. was discovered on the Azores in the middle of the 18th century. Experts say the find is undoubtedly genuine.

Thus, we may take it as an established fact that at the end of the fourth century B.C. the Carthaginians, who learned navigation from the Phoenicians, reached the Azores, in other words, were plying the Atlantic far from the coasts.

The Phoenicians were long believed to have been the finest seafarers of antiquity. But when, at the beginning of the present century, archeologists brought to light the ancient Cretan civilisation, whose might lay in its fleet, it became clear that 1,500 years before the Phoenicians the subjects of King Minos had been sailing not only in the Mediterranean but also in the Atlantic. There are theories that the Cretans discovered the Canary Islands and the Azores, sailed to the shores of South Africa, and reached the New World 3,000 years before Columbus.

True, these are only hypotheses. There is no doubt, though, that the authors of antiquity used information obtained by Cretan seafarers. The geographical concepts of Homer, who was an indisputable authority for most of the geographers of antiquity, were a dim echo of the culture of the Mycenaean period that preceded the classical Greek culture. Moreover, it is highly probable, says Professor I. Tronsky, a Soviet expert on the ancient world, that the *Odyssey* contains some echoes of a more remote time than the Mycenaean period.

Now let us try to sketch the "historical layers" reflected in the medieval maps. First, the geographical concepts of the map-makers themselves, men of the Middle Ages inclined to invent and capable both of believing fables and of creating them. Second, the works of Arab cartographers and geographers with which medieval scholars were familiar. Third, the sources of antiquity. Fourth, the voyages by Phoenician navigators (who were reluctant to relate what they had accomplished, preferring to recount horrors and fables about the Atlantic). Fifth, Homer. Sixth, "Mycenaean geography", which took shape several

centuries before classical Greek antiquity and on which Homer relied for information. Seventh, the geographical information provided by the Cretans, teachers and predecessors of the Mycenaean Greeks. Thus, the sources of the legendary islands depicted on medieval maps reach far back into antiquity. Was there a time when those islands were not legendary but actually existed?

The Bed of the Atlantic

The Atlantic has been better studied than the other oceans, although it covers a large area, only the Pacific being larger. Oceanographers divide the Atlantic into three portions. The first starts at the southern extremity of the underwater elevation between Greenland, Iceland and Scotland, which is known as the Atlantic Sill, separating the Atlantic from the Arctic. A line connecting the Hebrides with the eastern extremity of Labrador marks its Southern boundary. The second portion is the South Atlantic, and the third is the central section of the ocean. The main feature of the relief of the Atlantic bed is a gigantic mountain system that snakes its way across the entire length of the ocean for thousands of kilometres from the Arctic Circle to the Antarctic Circle. This is the Mid-Atlantic Ridge.

Covering, with its spurs, almost one-third of the ocean floor, the Mid-Atlantic Ridge runs fairly exactly through the centre of the Atlantic. It is between 500 and 1,500 kilometres wide, with an average height of 1,830 metres, although some sections rise to as much as four kilometres. This ridge running between Europe and North

America and between Africa and South America is one of the most magnificent formations of the earth's relief. It looks, says the well-known British oceanographer and geophysicist T.F. Gaskell, as though someone had tried to build a wall between two large land masses but did not finish his work, since almost everywhere there are about 1,500 fathoms of water between the top of the wall and the surface of the ocean.

The northernmost section of the Mid-Atlantic Ridge, known as the Reykjanes Ridge, runs from 55° N right up to Iceland. Geologically, Iceland may be considered a gigantic rise that is more than 400 kilometres across. Not far from the end of the Reykjanes Ridge lie the spur-like Faraday Mountains, part of the underwater Telegraph Plateau which, according to the latest oceanographic data, is not a plateau as such but an area of much more complicated formation.

The Mid-Atlantic Ridge continues north of Iceland, beneath the cold waters of the Arctic Ocean.

In 1960 Soviet arctic geologist Y. Gakkel put forward a hypothesis that still farther to the north the Mid-Atlantic Ridge gave way to what he called the Mid-Arctic Ridge. The hypothesis has been fully corroborated. Detailed research in the Arctic Ocean in recent years by the Soviet Union's Institute of Arctic Geology and Arctic and Antarctic Institute shows that a Mid-Arctic Ridge does exist. It is a continuation of the Mid-Atlantic Ridge and the northernmost branch of the global system of oceanic ridges.

Soviet oceanographers and geophysicists have also made discoveries in regions of the Atlantic that lie much farther south. Most of these discoveries are connected with the Mid-Atlantic Ridge.

Not long ago, for example, an oceanographic expedition aboard the *Mikhail Lomonosov* investigated about 1,500 kilometres of the ocean bottom, from the Reykjanes Ridge to the Azores, and found that here, too, the relief of the Mid-Atlantic Ridge is highly complicated, with great differences in height, and with steep slopes. South of this region come the mountains of the Azores Plateau. It is possible, according to Soviet oceanographer A. Ilyin, that there is another mountainous region in this part of the Atlantic Ocean, for the plateau is in the shape of a semi-circle having a radius of about 600 kilometres. It adjoins the Azores Islands in the south and the eastern slope of the North Atlantic Ridge in the north-west. On another voyage researchers aboard the *Mikhail Lomonosov* discovered new submarine mountains that may possibly indicate the existence of a continuous range.

Two islands in the Azores, Corvo and Flores, are peaks of the Mid-Atlantic Ridge that have emerged above the surface. The other islands lie on top of the vast underwater Azores Plateau bordering on the ridge.

The closer the mountains of the Mid-Atlantic Ridge come to the equator the more sharply their altitude drops. Near the equator itself the ridge is interrupted by the deep Romanche Trench.

The Romanche Trench divides the ridge into two sections: the North Atlantic Ridge in the Northern Hemisphere, and the South Atlantic Ridge in the Southern Hemisphere. The South Atlantic Ridge is an even greater mountain system, whose highest parts emerge above the water as the Ascension, Tristan da Cunha, Gough and Bouvet islands. The Walvis Ridge stretches towards it from the shores of South-West Africa.

Not far from the Antarctic coast the South Atlantic Ridge (through the intermediate African-Antarctic Ridge) becomes the Atlantic-Indian Rise linking the vast complex of the underwater Atlantic with the still more gigantic global system of mid-oceanic rises that engirdle the continents.

When and how was the Mid-Atlantic Ridge, the "submarine stem" of the entire Atlantic, formed? Although the first theory of its origin was advanced in 1900 and since then there has been a large number of the most diverse explanations, not one of them has been completely and unanimously accepted. Supporters of the continental drift theory maintain that the Mid-Atlantic Ridge is evidence that a single land mass split up and the portions were divided by oceans; that the Atlantic, in other words, is in the nature of a fissure between continents; and that the existence of islands and large land masses in the region of the present ridge is naturally out of the question. Yet numerous facts indicate that Mid-Atlantic Ridge, or separate parts of it, could have risen considerably above the sea.

When did those abovewater areas sink to the bottom? Geologists say the Atlantic basin began to take shape about 100,000,000 years ago and regard it as the world's youngest ocean. Is it possible that the final shaping of the Atlantic Ocean took place only recently and was completed at the end of the last glaciation, 10,000 or 12,000 years ago? That even later than this there were islands and islets that became submerged? That they still existed several thousand years ago and are the islands that appear on ancient maps and are mentioned by the seafarers of antiquity? Cannot oceanography help to solve the riddle of

the mysterious islands of the Atlantic, one of the toughest problems faced by historians of geographical discoveries?

Thule, Dunejar, Buss and Mayda

Pytheas of Massilia (Marseilles) was a name the ancients considered to be synonymous with an inveterate liar, a kind of Baron Munchausen. How otherwise could you regard a man who claimed to have travelled to a country where night lasted only two or three hours? North of this place, said Pytheas, there was a "sea that had folded up". Besides, could anything be more ridiculous than Pytheas' idea that the tides were caused by the moon?

Many a scholar of antiquity waxed indignant over Pytheas' "fables". Yet his writings are evidence that this Massillian was an observant traveller. His descriptions of arctic lands and ice are exact, no matter how fantastic they seemed to men who lived along the warm Mediterranean. Moreover, he was the first to arrive at a correct notion of the tides. Today Pytheas has been completely rehabilitated, declares Professor Richard Hennig, outstanding historian of geographical discoveries. Professor Hennig says that Pytheas was undoubtedly a scholar in the highest sense of the word, and that we can only regret we know so little about the life and explorations of this great man.

During his voyages Pytheas visited the island of Thule, "the most distant part of the habitable world". The voyage from the Orkney Islands, north of Scotland, to Thule took him five days. Pytheas found Thule a fertile island inhabited

by civilised people. To men living in the age of the decline of classical antiquity and to medieval geographers Thule, or Ultima Thule (Farthest Thule) symbolised the "edge of the world".

After Pytheas came to be regarded as reliable, historians of geographical discoveries attempted to pinpoint Thule. But actually, the first hypothesis concerning Thule's whereabouts was advanced in the year 825 by an Irish monk named Dicuil. In his book *De mensura orbis terrae* (*On Measuring the Earth*), in which he described various parts of the world, Dicuil said that Thule was Iceland. This view had supporters for more than one thousand years. Until the end of the last century Dicuil was considered indisputably right. It is now known, however, that Iceland was unpopulated before the eighth century A.D. But Pytheas, who visited Thule in the fourth century B.C., speaks of its inhabitants.

There were attempts to indentify Thule with one of the Shetland Islands, but the summer night there lasts more than the two or three hours of which Pytheas speaks. Fridtjof Nansen, the Norwegian arctic explorer, suggested that Thule was in the northwestern part of Norway, in the Trondheim Fjord area. After all, Pytheas' contemporaries thought Scandinavia was an island, and so did later geographers (right up to the 12th century). But the climate of Thule is too mild for Norway. (According to Pytheas, the inhabitants of Thule cultivated grain and kept bees.) Besides, it is unlikely that Pytheas could have sailed from the Orkney Islands to Trondheim Fjord in only five days.

And so, the whereabouts of Thule remains a mystery. There are no islands in the North Atlantic between 61° and 63°N (which is where

the summer night lasts two or three hours) that have a mild climate and are five days' sailing from the Orkney Islands. Soviet researcher N. Zhiron believes that Thule vanished, becoming a bank of the Faeroe Rise. The mild climate of the Arctic island of Thule could be explained by the fact that it lay in the mainstream of a powerful sea current several times warmer than the present Gulf Stream.

Only underwater archeological research in the area of the Faeroe Rise and its shallow banks can confirm—or refute—Zhiron's hypothesis. Investigation in other areas would help: around the Reykjanes Ridge; the Rockall Plateau, with its extensive bank topped by a shelf 110 kilometres by 50 kilometres in size and the rocky islet of Rockall; Porcupine Bank, which is an extension of the continental shelf of Ireland and has shoals lying at a depth of only some 150 metres. If it is shown that land sank in those places comparatively recently and, moreover, if traces of man are found on the floor of the Atlantic, it may someday appear that many mythical islands of the Atlantic once actually existed.

These islands might be "the land to the west, opposite Iceland" reported in an Icelandic manuscript of the early 14th century. Or Duneyar (the Dune Islands) mentioned in a 16th century manuscript. Or the mysterious Buss Island in the legends of Irish sea-rovers (legends say it sank to the bottom of the ocean). Or Green Island, which medieval cartographers placed south-west of Iceland, or Man Island (also known as Mayda or Asmaide), or even, perhaps, fabulous St. Brendan's Island and the equally fabulous island of Brazil (or O'Brazil, meaning "lucky"), which are still to be found on maps compiled before 1830.

But we cannot say, prior to detailed underwater exploration in the area of the Reykjanes Ridge, the Rockall Plateau and Porcupine Bank, that the hypothesis of mythical islands at the bottom of the Atlantic is without any foundation at all. Legends about sunken islands and regions are widespread among the Irish, the first Europeans to venture out into the stormy waters of the North Atlantic. (There is a theory that the Irish, the descendants of the ancient Celts who once inhabited England and France as well as Ireland, discovered America before the Norsemen, to say nothing of Columbus.) We do not know how far back into remote antiquity the art of navigation of the Irish goes. A map drawn by Admiral Piri Reis in 1508, before he compiled his atlas of the "Southern Continent", bears a note saying that an island lying between Iceland and Greenland "burned up" in 1456. Surely this indicates that some natural disaster destroyed one of the Atlantic's "mythical islands".

True, since then there have been no witnesses to the sinking of islands in that part of the Atlantic. But the birth of an island was witnessed by thousands of people about a decade ago. This island, named Surtsey in honour of the fire giant Surta, a personage in Icelandic mythology, rose out of the sea in November 1963 when an underwater volcano erupted near the southern coast of Iceland. The emergence of this island shows that the earth's crust in that area of the Atlantic is not stable. If an island could have arisen so quickly there is no reason why other islands could not have subsided just as quickly.

Finally, a remarkable find was made in an area where sunken islands are assumed to be located. Two hundred and fifty kilometres west

of Ireland a fishing trawl brought up a vessel of grey clay with a Latin inscription scrawled on it. Does this find come from a shipwreck, or is it the first trace of one of the Atlantic's legendary islands, now at the bottom of the sea?

In the Southern Part of the North Sea

After Thule, Pytheas visited another island, Abalus, one day's sailing from the sea shoals "known as Metuonis". Here, he wrote, the waves threw amber up onto the shore, and the inhabitants "used the amber as fuel instead of wood and sold it to the neighbouring Teutons". Other ancient sources repeatedly mention the "amber island" (variously called Abalus, Abalcia, Basilia, Baunonia, Glesaria or Balcia).

Many scholars believe that these were simply references to the coast of the Baltic Sea, famous for its amber. But, according to Pytheas, Abalus had tides, and tides are not found in the Baltic. This means it could only be the North Sea or, to be more exact, the mouth of the river Elbe, which is as wide as a gulf, has extensive shoals, and could really have been called "the sea of Metuonis".

A glance at a modern map will show that the only island which could be one day's sailing from the mouth of the Elbe is Heligoland, a patch of land surrounded by an extensive reef that is barely under water. Once upon a time Heligoland was a large island. Within historical times, before the eyes of medieval man and modern man, it has been destroyed by the waves and has sunk below sea level. Near Heligoland the German investigator Jurgen Spanuth dis-

covered the ruins of ancient structures. Could this mean that Heligoland, or rather, what is left of the island today, was once part of the Amber Island mentioned by geographers of antiquity?

Although we do not know exactly what will be revealed by underwater excavations in the Heligoland area, we can be certain that the Abalus of Pytheas was not identical with ancient Heligoland. The island could not have been a major source of amber because amber is a fossil resin laid down in the Tertiary period which, say geologists, Heligoland did not experience.

Could Amber Island have been Sudstrandt, an island frequently mentioned in ancient sources as lying in a region rich in amber, but which vanished from the scene? However, in the early 13th century the island was just off the mainland, and 1,500 years ago was of course connected with it, for the area around the mouth of the Elbe and the southern coast of the North Sea in general have been subsiding for the past 2,000 years. After all, Pytheas speaks of a whole day's sailing to reach Amber Island.

That is why several scholars, including Professor Hennig, an authority on historical and geographical research, do not think either Heligoland or the sunken Sudstrandt can be considered the Amber Island of the ancients. Amber Island, they say, now lies at the bottom of the North Sea. Professor Hennig believes that it was situated between Heligoland and Sudstrandt.

Underwater archeologists will thus have plenty to do in that part of the North Sea. They will have to explore the sea bottom in the mouth of the Elbe, search for the sunken Amber and Sudstrandt islands, and investigate the sunken

parts of Heligoland. There are other islands to search for besides. A tidal storm on January 16, 1362, submerged Rungolt, an important commercial centre on the Island of Nordstrand, situated north of Sudstrandt. One hundred and fifty years earlier an enormous tidal wave had destroyed the big Slav town and port of Vineta. (In the early Middle Ages Slavs had settled not only along the southern coast of the Baltic but also in parts of Denmark and on the Schleswig-Holstein seacoast.) Vineta was founded in 950 and quickly grew into a big commercial centre on the North Sea until a cataclysm destroyed it in 1100. A search for Vineta will be one of underwater archeology's most exciting projects.

Still earlier a natural disaster had swept away Dorestad, another famous medieval port, situated at the mouth of the Rhine. In the year 864 a storm of unprecedented force flooded vast areas of Holland and Friesland, drowning Dorestad and the villages and settlements around it. When underwater archeologists explore the mouth of the Rhine they may discover just as many interesting things as they will when they explore the bottom of the mouth of the Elbe.

The shores of Holland continue to subside to this day, and dams and dykes are built to hold back the invasion of the sea. Earlier, man did not know how to fight the sea, and as a result many ancient and medieval settlements and towns lie at the bottom of the Zuider Zee, awaiting underwater exploration.

Old sagas speak of Hedeby, the main port of the Vikings. Hedeby played the same leading role in North European sea commerce in the Middle Ages as Hamburg does today. In 1930 archeologists started excavation of this famous

port, which was surrounded by a wall more than ten metres high. Thirty years later underwater archeologists took over the excavations. They found the charred remains of walls, Viking pottery, coins, spearheads and the bones of animals and human beings. These could be traces of the furious battle between the people of Hedeby and the Norwegians in the middle of the 11th century. The Norwegians won, and they destroyed Hedeby by fire in 1050. Its ruins, now under water, enable scholars to confirm the truth of the medieval chronicles and sagas.

Archeologists are discovering the remains of ancient and medieval settlements and towns at the bottom of the southern part of the North Sea, but there is no doubt whatsoever that they will find even more remains of primitive man. Europe was inhabited when the North Sea did not exist, when England and Ireland were not islands and Jutland and Scandinavia were not peninsulas but were all parts of a single land mass. Primitive man reached England by land.

Geology and oceanography tell us that the English Channel, separating Britain from the continent, is the sunken valley of an enormous river, tributaries of which were the Thames, Seine, Scheldt, Meuse, Rhine and other, smaller rivers of Northwestern Europe that now flow into the North Sea. Detailed surveys have shown that the valleys of these rivers form a broad network running along the slopes of the extensive shoal known as Dogger Bank. Traces of sunken forests and peat-bogs, various artifacts and the remains of primitive man have been found on the floor of Dogger Bank.

A bone harpoon of the Mesolithic period (between 10,000 and 12,000 years ago, the period of

the Stone Age between the Paleolithic and the Neolithic) was found in a chunk of peat scooped up by a dredge off the coast of Norfolk County in England. As Soviet scholars say in Volume One of their *World History*, "a significant part of the ancient settlements of that period now lies beneath the waters of the North Sea".

At the time when the land sank in the southern part of the North Sea, the Scandinavian Peninsula was rising in the northern part. Today the western shore of the Gulf of Bothnia is rising at the rate of one metre every century. The farther south the slower the rate of uplift, until it equals zero on the southern coast of the Baltic. From there on the coast sinks.

During dredging in the harbour of Rostock, one of the largest Baltic ports, in 1961, an ancient burial vault and traces of a Stone Age settlement were brought to light. A settlement at least 7,000 years old was discovered in the strait between Sweden and Denmark. Stone Age dwellings have been found along sections of the Danish and South Baltic coasts that lie below the present sea level.

Perhaps the ruins of Jomsborg, the mighty Viking fortress that the sagas say stood near the mouth of the Oder River, will be discovered under the water. Since there are fairly exact indications of where the fortress was situated, it should not be difficult for archeologists to find it. Yet they have failed to do so. Sceptics think that Jomsborg is a legend invented by descendants of the Vikings to extol the deeds of their forefathers. This is unlikely, for with each decade scholars become more and more convinced that the old sagas reported events truthfully.

Perhaps the reason why Jomsborg has not been

found is because it should be sought not on land but on the floor of the Baltic Sea, where other old settlements have been discovered. Who knows what unexpected and sensational finds will be made on the bed of the Baltic and North seas in the near future?

It is quite possible that the ruins of another famous port, Jumne, which the medieval historian Adam of Bremen called the largest city in Europe, will be found at the bottom of the Baltic. Jumne was a bustling mart where Slav, Saxon, Scandinavian and even Byzantine merchants gathered. The first beacons in Europe were set up at the entrance to the Jumne harbour.

Jumne belonged to coastal Slavs, who created a distinctive culture there and protected it from Viking sallies and "civilising" raids by German emperors and Christian bishops. A 12th century chronicle tells us that a Danish king captured Jumne and completely destroyed the "opulent city". Archeological excavations in Pomerania have not, as yet, uncovered the ruins of this Slav port. Some scholars have attempted in vain to prove that Jumne was the medieval town of Julin. But Jumne was utterly destroyed while Julin, now the Polish city of Wolin, stands to this day.

The Cassiterides or "Tin Islands"

Subsidence of the earth's crust is not the only reason why the North Sea is making inroads on the land. The action of the powerful tides is also destroying coastal sections. The steep chalk cliffs of France in the department of Seine-Inferieure shrink by 20 to 25 centimetres annu-

ally. Geologists have estimated that Cape Cornwall, a headland on the south-west coast of Cornwall County, has lost about 600 cubic kilometres of land in human times alone.

Cape Cornwall had large tin mines that are now under water. Medieval records speak of Dunwich, a town that existed for more than 1,000 years. Eleventh-century documents note that some of the lands belonging to the town could not be taxed because they had been swallowed up by the sea. Later manuscripts relate how Dunwich Monastery, the old harbour, churches, the road and the Town Hall were flooded by the sea. It appears that 400 buildings were swallowed up "at one stroke". By the 16th century less than one-fourth of the town was left. A forest situated two kilometres from Dunwich had become the bottom of the sea. Within a few centuries the town had declined into a tiny village.

The remains of sunken forests, settlements and human skeletons are being found in numerous other places along England's southwestern coast. Several thousand years ago many coastal areas became the sea floor. Researchers place the inundation at different periods, ranging between 25 and 50 centuries ago.

Celtic legends speak of the islands of Ys and Lyonesse which sank in the sea. Lyonesse lay between the tip of Cape Cornwall and the nearby Scilly Islands south-west of it. A large town on the island was completely submerged and only one person survived the disaster, say the legends. It will be the job of future underwater archeologists to verify the truth of the legends, as well as to find the tin mines. The famous Cassiterides, or Tin Islands, lay somewhere south of this

region. Although many old sources speak of these islands they have yet to be found.

Does this not indicate that the mysterious Tin Islands could be at the bottom of the sea along with other unidentified islands mentioned by the geographers of antiquity and the Middle Ages? Both Pliny and Ptolemy, two great scholars of antiquity, say that the Cassiterides were situated about one hundred kilometres west of the northwestern extremity of the Iberian Peninsula, where there are no islands now but where oceanographers have found many shallow banks.

Gadir and Tartessos

The comparatively shallow depths here will allow archeologists using only aqualungs to verify that hypothesis. Also to be verified are hypotheses that two places mentioned by the ancients—the Island of Gades and the trading-town of Tartessos (capital of a state of the same name) “on the other side of the Pillars of Hercules”—are likewise on the sea bed. Incidentally, some ancient authors believed that Gades (or Gadir) was the Tartessos which the Phoenicians captured from the Tartessians. Most historians, though, think that Gades was founded by the Phoenicians at the end of the 12th century B. C. Gades was a dangerous rival of powerful Tartessos. (At first it was called Gadir, which means “fortress” in Phoenician, from which comes the modern name, Cadiz.)

In his *Geography* Strabo speaks of two islets situated near the Pillars of Hercules, one of which bore the name of the goddess Hera. (At the time Calpe, the rock on the Spanish coast,

and Abila, the rock on the African coast, were called the Pillars of Hercules; there are no islands in the Strait of Gibraltar today.) About 150 kilometres to the west, "on the other side of the Pillars", were the Island of Gadir and the city on it, also called Gadir, which in population was "second only to Rome". Despite their large numbers the inhabitants occupied an island no more than 100 stadia long (about 20 kilometres—*A. K.*), which in some places was only one stadium wide (about 200 metres—*A.K.*). That was because "only a few live there permanently since the rest are for the most part at sea, although some live on the mainland opposite, especially on the islet in front of Gadir because of its convenient location".

Strabo gives a highly realistic description of the occupations and customs of the inhabitants of Gadir. Yet one will search in vain for the island of Gades and its neighbouring island on a map of the Strait of Gibraltar. They are most probably under water, for west of Gibraltar there is a vast area of shallow banks and sea-mounts where the earth's crust has subsided catastrophically and the area has repeatedly been shaken by violent earthquakes. (There was the frightful earthquake of 1775 which razed Lisbon, took a death toll of 50,000 persons, and sucked an enormous wharf into a yawning abyss.)

A similar cataclysm may have destroyed the ancient city of Tartessos, which is mentioned in the Bible as Tarshish. King Solomon used to send his ships to Tarshish, from which they always returned richly laden. The prophet Jonah wanted to flee to distant Tarshish, and only God's "intervention" prevented him from doing so. Authors of antiquity, too, mention the riches

of Tartessos; it was a symbol of wealth to the poets of Hellas. Indeed, archeologists have found rich treasures buried in Spain. Written records discovered in Southern Spain tell us that the inhabitants of Tartessos were civilised people who had created a script of their own. Strabo called the Turdetans, descendants of the ancient inhabitants of Tartessos, the most educated of all the Iberian tribes.

Where does one look for Tartessos, capital of the land of Tartessos? Ancient authors say it was situated on an island at the mouth of the Bethia River. Modern scholars think this is the mouth of the Guadalquivir, several arms of which flowed into the sea at that time. Thorough excavations in that area have yielded nothing, and it is quite possible that archeologists should search the river bed instead, for the mouth of the Guadalquivir is a tectonically mobile region.

The search for Tartessos, Zhirov thinks, should be shifted much farther to the west, into the area of the submarine Horseshoe Archipelago, situated in the Atlantic Ocean from 500 to 600 kilometres west of Gibraltar. This strikes us as being highly doubtful. However, study of the Horseshoe Archipelago and the nearby shoals should yield much of interest to archeologists and historians as well as to oceanographers.

Not long ago boulders and pebbles brought up from the tops of newly discovered seamounts turned out to have been rubbed smooth by the surf, which means they stood above water once upon a time. The structure of the earth's crust in the region of the Horseshoe Archipelago tells us that the land there, and also to the east and south, could have subsided fairly recently, geologically speaking.

All those submarine elevations are connected, and they are linked up with the continent by a ridge that runs to the southwestern coast of the highly tectonic Iberian Peninsula. Significantly, most of the legendary islands on medieval maps of the Atlantic Ocean are located in this particular region.

In a monograph on these islands the American scholar W. H. Babcock suggested, in 1925, that some of the shallow banks west of Gibraltar might have been visible, and even inhabited, in a period when man had attained a moderate degree of civilisation. It is quite possible that the last remnants of islands that were the summits of seamounts sank into the sea only one or two thousand years ago. (Spanish folklore mentions the "enchanted isle" of San Morondon.)

There is, however, the possibility that the islands on the medieval maps are merely an echo of the concepts of the ancients, based on the geography of Homer, which in its turn goes back to the time of the Mycenaean culture and its links with the still more ancient Cretan culture. Thus, information about islands in the region of the submarine Horseshoe Archipelago may be all five or six thousand years old. If the level of the Atlantic were to drop a mere 200 metres (as a result, for instance, of tectonic subsidence), an entire archipelago covering 350 square kilometres would appear in the area between the southwestern extremity of Portugal and the western coast of Morocco. Yet the level of the World Ocean has risen appreciably over the past several thousand years.

Myths that date back to remote antiquity speak of Erytheia, an island to which Hercules voyaged. Geographers of antiquity placed Erytheia

in the Atlantic, opposite Portugal. Wily Ulysses, hero of Homer's *Odyssey*, visited the island of Scheria, inhabited by a dark-skinned, seafaring people, the Phaeacians. These islands may now be lying at the bottom of the Atlantic. Professor Hennig thinks that Homer's Scheria should be identified with Tartessos. Many scholars believe that the myth of Ulysses' voyage to Erytheia shows that the Greeks (and Cretans) were familiar with the Canary Islands. Those islands, however, lie at some distance from Portugal, and they deserve closer examination.

Island Groups

There are five island groups in the Atlantic which lie closer to the shores of the Old World than to America and have many features in common in geological structure, climate and flora and fauna. They are: the Canary Islands off the coast of North-West Africa; the Selvagen islets north of the Canary Islands; Madeira, Porto Santo and Desertas; the Cape Verde Islands off West Africa opposite the cape of the same name; and, finally, the Azores, in the mid-Atlantic, halfway between the Old World and the New.

All the islands except the Canaries were uninhabited when they were discovered by European seafarers. The Canary Islands were inhabited by the Guanches, a tribe that still puzzles anthropologists, historians, linguists, archeologists and, especially, historians of geographical discoveries. For the now extinct Guanches did not have ships, boats or even rafts. How did they reach the Canary Islands, separated from the

African coast by many kilometres of water? Scholars have put forward several contradictory hypotheses. The Soviet historian B. Bogayevsky, for example, assumes that man reached the Canary Islands by land when they were still a part of Africa. When portions of the African continent broke off in the early Neolithic period a fairly large island could have been formed. Later, parts of the island subsided, forming a group of islands inhabited by people unacquainted with navigation.

How true is this hypothesis? Geology and related sciences tell us that the Canary Islands really do have a close relation to the African continent, that they are fragments of a chunk of land which split off from it. Parts of the islands have alternately sunk and risen. The French geologist J. Bourcart has discovered, on Grand Canary Island, six alternate layers of continental and marine deposits separated by streams of lava. In other words, as a result of volcanic eruptions this island was submerged and elevated at least six times. That there is volcanic activity on the Canaries can be proved by the presence of a volcano on Tenerife Island which towers to an altitude of almost four kilometres.

The aboriginal inhabitants of the Canaries, the Guanches, were wiped out by European invaders several centuries ago, long before the science of ethnography took shape. The fragmentary and often contradictory information that we have from medieval Spanish chroniclers is of little help in solving the riddle of the Guanches. Archeological investigation of the Canaries is only just beginning and can tell us little as yet. From the few words and phrases in the Guanche

language that have come down to us, linguists at one time thought it to be an offshoot of the language of the Berbers, who have lived in North Africa since the dawn of history. But André Basset, an authority on Berber dialects, has shown that this relationship is only superficial. In short, the Guanche language remains a puzzle.

Rocks and cave walls on the Canary Islands are covered with pictorial inscriptions, but they are still unintelligible to scholars and cannot therefore throw any light on the origin and history of the Guanches. What is more, we do not know whether the inscriptions are texts in the literal sense, that is, whether they can be read at all in any language, or whether they are simply magic symbols and signs like the symbolics of Stone Age men, who had not developed the art of writing.

Although anthropology possesses the most extensive and reliable information about the Guanches, the study of the skeletal remains and skulls of early Canary Islands dwellers has complicated the Guanche problem more than ever. For one thing, it has been found that several ethnic groups with different racial characteristics lived on the islands. Secondly, and this is the most astonishing part of it, one of the groups belongs to an anthropological type that is very similar to the Cro-Magnon, a race of men who inhabited Europe between 20,000 and 40,000 years ago and belonged to the species *Homo sapiens*. Both the Guanches and the Cro-Magnons were tall (more than 180 centimetres), with large faces and heads and light hair.

How can this resemblance be explained? Were the inhabitants of the Canary Islands the last

group of the Cro-Magnons to survive until the Middle Ages? Or did the tall, blond Guanches reach the islands much later, say in the period of the great migrations, at the time when the Goths reached Spain and the Vandals went as far as North Africa? Then, cut off from the rest of the world, did they gradually lose their navigational skills? Or are we to believe those researchers who say that the Guanches never had any such skills, that they reached the Canary Islands across a land bridge that connected them with the continent?

Many theories concerning the Guanches have been advanced, but none can be said to be more or less convincing. Perhaps the riddle will be solved not by anthropologists, ethnographers, linguists or other scientists studying man but by oceanographers and geologists, the scientists who study the earth.

The first question they have to answer is that of when the land bridge between the Canary Islands and the continent sank to the bottom of the sea. Geologists are as sharply divided on this point as historians are on the origin of the Guanches. Some geologists say the islands separated from the continent long before man appeared on earth. Others say just the opposite, that the Canaries became islands only lately, in the present geological era, after the Ice Age.

The ancestors of the Guanches could naturally have reached the islands across a land bridge. But when did they do so? Was it 2,000 years ago? Or 3,000, 5,000 or 10,000 years ago? All these different dates have been suggested by scholars. Only further research will enable us to answer the questions which the Canary Islands have placed before scientists studying the earth and

scientists studying man. Underwater archeology is bound to play an important part in this.

It will also have to solve another puzzle—whether or not the other Atlantic islands were ever inhabited. The fact that they were uninhabited when discovered in the late Middle Ages means nothing. In the Pacific, for example, many Polynesian islands were once populated but later the inhabitants mysteriously vanished. (Take Pitcairn, the Line Islands in the middle of the Pacific, and Galapagos, to name but a few).

In the area of the Azores old maps show mysterious islands with large populations and large towns, like Antilia, or the Island of the Seven Cities. Yet the first Portuguese navigators did not find anything on the Azores except hawks. As a matter of fact, the name "Azores" comes from the Portuguese word for "hawks". The lands which medieval cartographers placed in the middle of the Atlantic may be a reflection of the notions of the ancients.

"There is an island distinguished for its size in the middle of the ocean opposite Africa. It lies at a distance of only a few days' sailing from Africa," says Diodorus Siculus in his *Historical Library*. "Phoenicians exploring the coast on the other side of the Pillars and sailing along the coast of Africa for the reasons given above were carried far out into the ocean by strong winds. They finally reached that island after voyaging in an unknown direction for many days."

In his *Parallel Lives* Plutarch speaks of two islands in the Atlantic separated by a narrow strait and lying 10,000 stadia (that is, about 2,000 kilometres) from the coast of Africa. They were called the Isles of the Blest. In the *Odyssey* Homer speaks of the Fortunate Islands far to

the west. Rufius Festus Avienus describes, in his *Oera Maritima*, an island in the Atlantic rich in grasses and dedicated to Saturn: "So violent are the forces of Nature here that as soon as a ship approaches the island the sea grows agitated, the island itself trembles, and the open sea heaves and shudders deeply, although the rest of the sea is as calm as a pond."

Are Diodorus Siculus, Homer, Plutarch and Avienus talking about the Canary Islands, as many historians of geographical discoveries claim? Avienus' tale of an island where "Nature is violent" cannot be applied to Tenerife, with its volcano of the same name, for he speaks of the "heaving of the open sea", something that is observed in the region of the Azores, where earthquakes and eruptions of submarine volcanoes are frequent.

The contours of the islands have changed considerably, even in historical times. In the middle of the 16th century a bay formed on the Island of San Miguel in place of an enormous volcanic crater. Two hundred and fifty years later, a new islet appeared near the bay, but the ocean waves soon swept it away. In 1957, literally before our eyes, a new island arose near the Island of Fayal, of which it soon became a part. The Azores are slowly sinking into the ocean at the rate of more than five millimetres a year. New islands are being born there and old islands are sinking.

A large chain of underwater mountains running parallel to the Azores was recently discovered south of the islands. These flat-topped mountains are typical guyots lying not far below the surface. If they had not subsided but were some 500 metres higher, a second Azores archipelago would be seen on maps of the Atlantic.

When did those mountains subside? Were there larger land masses in the region of the Azores? Were the Azores ever populated? The 17th century Portuguese historian Sousa says that soon after the Azores were discovered the statue of a horseman, without a saddle and with his head bared, was found at the top of a mountain on Corvo Island. His left hand lay on the mane of his horse while his right arm made a sweeping gesture to the west. The statue stood on a slab of the same kind of stone, on which were carved letters that could not be deciphered. Portuguese Christians regarded it as the statue of a pagan idol and destroyed it.

Many historians of geographical discoveries are inclined to think that the horseman with his arm flung out towards the west was merely a reflection of ancient notions of the Pillars of Hercules, signifying the "edge of the world".

However, the legend of the ancient statue is still alive among the indigenous inhabitants of Corvo Island. On the other islands of the Azores group there are legends about mysterious inscriptions on tombstones and whole cities engulfed by the ocean.

It is up to underwater archeology to verify whether these legends have any foundation in fact. What lends particular interest to exploration in the region of the Azores is the fact that this is where, in the opinion of modern advocates of the Atlantis theory, the lost Island of Atlantis, mentioned by Plato, is situated.

So many books, articles, studies, stories and novels have been written about Atlantis that instead of devoting space to the hypothetical continent itself we shall merely dwell a bit on the passions it has aroused.

Atlantophiles and Atlantophobes

A scholar once remarked that a catalogue of what has been written about Atlantis would be a splendid illustration of man's folly. That remark is unfair with respect to scholars of the past, for they attempted to solve the riddle of Atlantis at the level of their time. It is also unfair to many modern scholars who are trying to utilise the latest findings in archeology, oceanography and other sciences to create a real science about Atlantis. (We shall not go into the question of whether their arguments are convincing or not.)

However, the above statement is fully applicable to those who fanatically support the Atlantis of Plato—not a geological or cultural-historical Atlantis but the Atlantis which the great Greek philosopher described, no matter how many of the details in the *Dialogues* are contradicted by the findings of modern science. These men ignore facts. Nor are they much interested in theories. They simply *believe* Plato. And faith, as the brilliant 19th century Danish philosopher Soren Kierkegaard once penetratingly observed, is hostile to proof.

These people look on the *Timeaus* and *Critias* dialogues as holy writ, every word of which is sacred. Plato is their prophet. They do not argue with those who disagree but simply ignore them.

Crazes produce phobias, and so there are the Atlantophobes, who hate to mention Atlantis in their research work whether in the field of oceanography, ethnography, folklore or geology. Those who oppose the Atlantis theory state categorically that the question is settled or, rather, no longer to be considered. They do this with as much confidence as though they themselves had

witnessed events taking place 12,000 years ago. (Atlantophiles insist with the same confidence of eyewitnesses that there really was an Atlantis).

Archeologists, ethnographers, folklorists and historians minutely analyse the most fantastic and improbable legends and myths in an effort to sift out grains of truth, separate fact from fiction, and make corrections in the "myth prism" through which real events were refracted not only in folklore but also in the writings of the ancient philosophers and scholars, whether Pliny, Aristotle, Homer or Strabo. Only one ancient thinker is taboo in the scientific literature, or rather, two of his writings are taboo. The writer is Plato, and the writings are his dialogues *Timaeus* and *Critias*.

Yet these compositions contain more than literary illustrations of Plato's ideas about an ideal state. Plato tells us, for instance, that the ancient Greeks had writing before an alphabet was invented. For a long time that was considered to be a fiction, as was the existence of a pre-Athenian state. But when, on Crete and in Greece, archeologists discovered the traces of a civilisation preceding that of classical antiquity, they also discovered samples of writing which employed non-alphabetical characters. A written language therefore existed in Greece before an alphabet had developed. But was it used by the Greeks? Or were the texts written in another language, not in Greek? For more than half a century scholars were confident that this was so.

But after the writings were deciphered it was found that they had been written by Greeks who were the forerunners of the Greeks of classical antiquity. Therefore, Plato was right. Not in that there once existed, in ancient Greece, a

powerful state based on the ideals of Plato, and ruled by philosophers, but in that before the "classical" Greeks came to Greece there was a state (or rather, several city-states) established by Achæan Greeks who were the heirs to the civilisation of Crete. These Achæan Greeks used a script that was syllabic rather than alphabetic.

Plato evidently used sources dealing with the ancient Achæan culture and way of life of powerful "pre-classical" Greece. No wonder Professor Karpov, the first translator of Plato's *Dialogues* into Russian, pointed out that if we did not assume that many of Plato's facts were based on historical sources we would have to admit that the famous philosopher was unbelievably perspicacious. Which facts exactly? Perhaps they include Plato's assertion that a large country "on the other side of the Pillars of Hercules" sank to the bottom of the Atlantic some 12,000 years ago. Or is the description of Atlantis and its cataclysmic destruction an invention of Plato's that has no historical foundation?

The Mediterranean and Tyrrhenia

The remains of ancient structures have been found in many places on the floor of the Mediterranean Sea. The first submarine archeological investigations conducted there in the early thirties by the French explorer A. Poidebard were in the area of Tyre, the famous Phoenician port in the east Mediterranean. According to ancient records, Tyre, now a small fishing town, had two harbours, yet until the present century no traces of them had been found in the vicinity. Aerial photography in 1934 showed

dark patches stretching along the edge of the sea. An observation chamber was lowered into the water and then divers went down. (In those days, before scuba diving, archeologists had to employ the services of professional divers instead of doing the exploring themselves.) The divers found both harbours of Tyre as well as the remains of a breakwater almost two hundred metres long.

A study of these remains enabled scientists to reconstruct many details of the assault launched against Tyre by Alexander the Great. Tyre stood on an island. Alexander ordered his men to fill in the strait that separated this great port of the ancient world from the mainland. Today Tyre is situated on a small peninsula.

After the Second World War Poidebard conducted underwater excavations of the famous Phoenician port Sidon, whose construction, he discovered, differed from that of Tyre, its rival and ally. Sidon could be entered either through a narrow passage between the breakwater and the islet, or through a canal built between the islet and the shore; the canal crossed a sandbar too shallow even for the flat-bottomed boats of the time.

Subsidence of the sea bottom in the area of Marseilles has taken place in more recent times. The town of Sainte Maries had to build a dike early in the 18th century to hold back the sea. A monk living at the end of the 17th century wrote that the sea had swallowed up two kilometres of land since the time of his youth. Investigation of the bottom of the Gulf of St. Gervaise revealed the remains of numerous large structures that date back 2,000 years.

At present submarine archeologists are searching in the region of other ancient ports along

the coast of Southern France. Their work is facilitated by the fact that the ruins lie in shallow water close to shore. For example, the remains of a Roman port and villa found near the small town of Fosse-sur-Mer near Marseilles.

In some parts of the Mediterranean remains of ancient structures jut out of the water. The temple of Jupiter Serapis on the shore of the Bay of Naples interests not only archeologists and historians but also geologists and oceanographers, for it illustrates the shifting of the earth's crust. Nature has left convincing "inscriptions" of this on the marble columns, twelve metres high, that are the main part of the temple ruins.

The columns were discovered in the middle of the 18th century. They stood on the shore of the bay, half buried in sand and ash and overgrown with bushes. After they were dug up and the marble floor on which they stood was cleared it was found that the entire floor and the columns themselves, up to a height of three and a half metres, had been pitted by mollusks.

The temple, built at the beginning of the Christian era, had slowly subsided into the sea and by the 13th century only six metres of column tops rose out of the water. Three centuries later the temple started to rise out of the water, revealing its pitted columns and floor. It did not rise much. A Roman road running between the temple and the shore remained under the water, as did enormous blocks of stone with mooring rings in them. Soon after, the temple began to sink again.

When Charles Lyell, the British geologist, visited the ruins of the Jupiter Serapis temple in 1828, he noted that the foundation of the columns had sunk about 30 centimetres below sea level.

Half a century later the foundation had sunk another 65 centimetres. By 1911 the temple had subsided almost two metres. Professor Gorshkov of the Soviet Union, who was there in 1954, noted that the water had risen 2.5 metres. Thus, the land has subsided at the rate of 1.7 centimetres a year over the last century.

Other sections of land on which ancient hamlets and towns stood on the Bay of Naples could also have subsided. During investigation of the sunken sections of the famous ancient Roman resort of Baiae at the end of the fifties, underwater archeologists discovered the ruins of large structures at a depth of up to ten metres. The ruins of a city which sank into the Tyrrhenian Sea had been found on the latitude of Rome several years before. It is possible that land subsided along the Tyrrhenian Sea in more ancient times and that entire regions as well as towns and temples were drowned. This is indicated by the significant number of sunken valleys found along the western coast of Corsica. They all correspond in shape to the valleys on land; each bay has its undersea continuations.

Could this not mean that there was once a large land mass there? Perhaps the traces of a mysterious Stone Age civilisation which archeologists are bringing to light on Corsica, Sardinia and Sicily are connected with that now sunken land mass. On Corsica archeologists recently discovered granite statues three metres high and decorated with bas-reliefs depicting weapons. According to the London *Times*, they belong to the very earliest known depictions of human beings. What will underwater archeology bring to light? Will it reveal traces of sunken towns and settlements at the bottom of the Tyrrhenian Sea? Perhaps

new discoveries will lift the veil of mystery surrounding the origin of the earliest inhabitants of that area, with their distinctive cultures and languages not affiliated with the Indo-European family.

Modern linguists sometimes call the Etruscan language their biggest headache. The Etruscans were the teachers of the Romans; they showed the Romans how to erect buildings and plan cities and build water mains and sewage systems. The Etruscan alphabet was the prototype of Latin, the alphabet on which most modern written languages in Western Europe, America, Africa and Oceania are based.

Scholars learned to read Etruscan texts, written in an alphabetical script close to the Greek, without particular difficulty several centuries ago. But most of the texts cannot be understood to this day. The Etruscan language has no known affiliation with either living or dead languages. Comparison with the Albanian and Dravidian languages, with the Slavic and Caucasian languages, with the language of the Basques and the languages of the American Indians, with the Germanic and Baltic languages, with Latin, Hittite, Greek and many others has not led to a full understanding of Etruscan texts.

The relationship of the Etruscan language to the world's other languages remains a riddle as does the origin of the Etruscans, teachers of the Romans who, in their turn, were teachers of the peoples of Western Europe.

In recent years underwater archeology has begun to help the scholars who are studying the culture, history, language, art and ethnogenesis of the mysterious Etruscans. The ruins of two Etruscan ports have been found at the bottom

of the Tyrrhenian Sea, sixty kilometres north of the mouth of the Tiber. Even more valuable finds have been brought up from the floor of the Adriatic. Spina, a port in the delta of the Po river known as the "Etruscan Venice", has been excavated. At the beginning of the excavation thousands of Etruscan graves were found in the silt and under the water, and then the city itself, justly called "Queen of the Adriatic", was discovered.

Archeologists have found several settlements and the ruins of whole cities at the bottom of the Adriatic. Like the Tyrrhenian coast, the Adriatic coast has sunk since ancient times. For example, the mooring walls of the Roman port of Ostia now lie beneath almost three metres of water. A study of the Adriatic coast and the sunken lands is just beginning, and it holds out great promise.

A stone wall, the remains of a harbour structure of antiquity, has been found on the floor of the Adriatic some two and a half kilometres from the mouth of the Po. Eight hundred metres from the shore of the resort of Gabicche scuba divers have found the ruins of a drowned Roman town, including a triumphal arch and a column topped by an eagle, symbol of the Eternal City.

Near Venice, three kilometres from Lido, at the bottom of a lagoon, they have discovered the remains of one of the towns from which modern Venice arose. Year after year the town and its towers, houses and walls sank lower and lower until, in 1100, a submarine earthquake drowned everything. Underwater archeologists have found, in the Gulf of Venice, the legendary fortress of Bibione, supposed to have been the last residence of Attila, the King of the Huns, known as the

Scourge of God. Perhaps scuba divers will be lucky enough to find Attila's treasure, according to legend buried in Bibione. Scientists have brought to light a wealth of archeological finds from the floor of the Adriatic, including the ruins of towers, walls, stairways and buildings, burial urns and a large number of ancient coins and household utensils.

Tritonia? Aegean Continent? Bosphoria?

The Ionian Sea, which washes the Apennine Peninsula on the south, also contains archeological monuments. One of them is a large graveyard of ships that was found in the Gulf of Taranto. No less interesting is the discovery made not long ago through aerial photography which shows that the ruins of an ancient city lie on the floor of the gulf. Historians believe this to be the remains of Sybaris, a famous port of antiquity. Only underwater excavation can provide the answer.

Even more discoveries await underwater archeologists south of Taranto, along the coast of Sicily. Every square metre of Sicilian land, say experts, conceals relics of antiquity and even earlier monuments, as well as traces of the island civilisation that flourished in Sicily long before the Greek colonisation, which itself dates back more than 2,500 years.

It turns out that the coastal waters of this island of archeological treasures, particularly the waters along the southern coast, also contain much of value to science. Sunken ships, amphoras, marble columns and the ruins of a temple have been found there. Still farther south, be-

tween Sicily and Africa, whole settlements and large structures have been discovered.

In 1958 an enormous wall sixty metres high and built of large stone blocks was discovered there, near the small island of Linosa, at a depth of thirty metres, by an Italian scuba diver. A study of the wall, on which a large stone statue stood, showed that it had once surrounded some ancient town. Scholars think this may have been Ephusa, a port of the fourth and third centuries B.C., which ancient sources mention repeatedly. But there are still more fascinating theories. Big structures have been found on Linosa, Pantelleria and Malta—the largest island between Sicily and Africa—that date back to an island civilisation of the fourth and third millennia B. C. It is quite possible that the wall was erected in that remote period.

One would think that the older a structure the greater the chances that it vanished beneath the waves in the distant past. But changes in the contours of islands and the sea floor are continuing to take place in the Mediterranean. For example, an islet rose out of the sea near Sicily in the 19th century, and countries argued about who should possess it. While they argued, the islet sank back to the sea floor.

The Mediterranean was once a lake whose outlet into the Atlantic was barred by a neck of land later destroyed by an earthquake, say geologists. There was another isthmus as well, between Sicily and Africa. This was the bridge over which ancient peoples crossed from one continent to another. That would explain the traces of the Negroid race found in Italy and even in England. Land subsidence could have taken place even after man learned to build towns. It is quite

possible that underwater archeology will reveal remains of these earliest towns at the bottom of the Mediterranean.

Perhaps only underwater research will enable legendary Lake Triton and the Hesperian Islands west of it to be found. The land of the lotus-eaters whom Homer describes in the *Odyssey* probably had some connection with those islands. Aristotle thought there was a lake-like sea in Lybia at one time which was separated from the Mediterranean by a "lakeside swell", and when this swell, or isthmus, was breached, Lake Triton vanished.

Did there exist a region that could be called Tritonia, long since sunken, in place of what is now the Gulf of Sidra, known in antiquity as the Syrtis Major, on the coast of North Africa? Underwater archeological research along the coast of Lybia is only just starting. In 1958 a British expedition studied the ruins of the sanctuary of Apollo at Cyrene, a city which the Greeks founded on the shores of Africa more than 2,500 years ago. The harbour works have completely vanished underwater. Scuba divers had the greatest difficulty in mapping the intricate labyrinth of protective walls, towers, docks and the sanctuary of Apollo.

In 1958 the remains of the Roman port of Ptolemais in North Africa was discovered on the sea floor. Seven years earlier Greek sponge divers had found the remains of columns, arches and bridges near the Island of Jerba, off the coast of Tunisia. The columns, arches and bridges were neither Roman nor Greek but resembled, rather, the architectural style of ancient Crete, the cradle of European civilisation. The coast of Crete itself, for that matter, promises under-

water archeologists many interesting discoveries.

British researchers have conducted underwater excavations at the site of the ancient port of Chersonesus on the northern coast of Crete and now under the waters of the Aegean Sea. Chersonesus was built several thousand years ago by the Minoans who inhabited ancient Crete. Then it became a Greek port and later a Roman port. The sea swallowed it up after a submarine volcano erupted with terrible force about two and a half thousand years ago. Archeologists have studied the layout of the port, with its piers and breakwaters, and its original fish "refrigerators"—basins carved in the cliff, where fishermen kept their catches. (The basins were so built that fresh water could flow in and out of them.) Not far away, underwater archeologists have found several lovely Cretan vases between 4,200 and 4,500 years old. These are among the earliest finds ever made on the sea floor.

Many treasures as well as towns and hamlets are to be found under the water along the coasts of Crete and Greece and around numerous islands in the Aegean Sea. The ruins of ancient Theia, fragments of columns, statues, vessels and the like have been found not far from the modern town of Katakilon on the Greek coast.

The sea has covered the greater part of the Greek town of Epidauros. The remains of a basilica that is almost 1,500 years old have been discovered in the Gulf of Aegina. Ancient graves and crypts covered by water have been found at Piraeus, Melos and Crete. Walls of sunken ancient towns can be found along the coast of other parts of Greece.

Historians give the name Aegean to the lands

and countries washed by the Aegean Sea, where European civilisation arose many thousand years ago. Geologists give the same name to the land mass that once existed in the place now covered by the Aegean Sea. Is there any connection between the historical Aegean and the geological Aegean? "It is now recognised that the subsidence of the land that led to the development of the Aegean Sea took place, geologically speaking, quite recently, in the Quaternary period, perhaps in human times," says Academician Lev Berg, who thinks that "if we believe the description of Atlantis which Plato gives in his *Critias* there is nothing that runs contrary to our information about the nature of the hypothetical Aegean continent, to the degree that we can gain an idea of its nature from its fragments such as the modern Aegean islands of Chios, Crete and the Cyclades."

We shall not go into the 150-year-old controversy between those who believe Atlantis was situated in the Aegean Sea and those who think that Plato was correct in placing it beyond the Pillars of Hercules. Nor shall we touch on the debated point of when the Aegean continent subsided. Some say it was in the Tertiary period, others in a period between glaciations, and still others at the end of the last glaciation. We shall merely note that sections of land in the area of the Aegean Sea have subsided, as a result of natural calamities, in quite recent times.

In their study of the ancient culture of Crete, archeologists have found that all the towns, ports and settlements on the northern and eastern coasts of the island were destroyed in some cataclysm about 1500 B.C. In 1960 the Greek scholar A.G. Galanopoulos advanced an interesting explanation for this. In the centre of the crater of a

drowned ancient volcano on the Island of Santorin (Thera) in the Cyclades area there is a new volcano which is still active. Investigations have shown that a natural disaster of terrifying proportions took place there about the year 1500 B.C. The explosion of the ancient volcano covered the entire surface of the island with ashes and a layer of lava twenty metres thick. Then the top of the volcano caved in, and the Aegean Sea rushed in to fill the caldera, which covers an area of several dozen square kilometres.

The eruption on Thera was, say experts, several times more powerful than the explosion of Krakatoa in the East Indies. The shock waves following the Krakatoa eruption travelled three times round the world, crashing against the coastlines and destroying communities situated on nearby shores. The Thera cataclysm caused the inhabitants of the Aegean area even greater damage than that. It wiped out the settlements on the northern and eastern shores of Crete.

Galanopoulos thinks that this catastrophe was what gave Plato his original material for the story of Atlantis and its destruction. Whether this is so or not is an interesting and involved question. We do not intend to go into the fine points of the Atlantis debate. We can be certain, though, that the explosion on Thera could not have been completely erased from the memory of succeeding generations. The earth sciences will help to solve not only archeological and ethnographic riddles but also complicated and fascinating problems in the history of religions and myths.

Believing that there had been three deluges altogether, the ancients linked up the bursting of the Black Sea, once a lake, into the Mediterra-

nean with the Dardanus deluge. The Black Sea broke through into the Mediterranean by first forming the Bosphorus Strait and then the Dardanelles. Modern science confirms the scholars of antiquity and the Greek myth by declaring that in the Quaternary period the Black Sea ceased to be an inland sea and became connected with the Mediterranean.

Some scientists say that this happened as far back as hundreds of thousands of years ago. Others give a much later date, between 4000 and 2000 B.C. Could man have preserved, even as a myth, the memory of the bursting of the Dardanelles? How old is this memory? It will take the joint efforts of many scientists, from marine geologists to experts in ancient mythology, to answer those questions. But regardless of when the Dardanelles burst, the contours of the Black Sea today differ from those of only some 2,000 years ago. At the bottom of the Black Sea and Sea of Azov, connected with it, lie the ruins of ancient towns that are now being intensively studied by Soviet and Bulgarian underwater archeologists.

From Pontus to the Antilles

"Traces of Ancient Culture on the Sea Bed. Monuments of Antiquity Found in the Sea." This was the title of an article by a Russian engineer named L. Kolli which appeared in the *Transactions of the Taurida Archival Commission* for 1909. Kolli knew that when a port was built in Feodosia at the end of the 19th century the ruins of structures that might have dated back to antiquity were found. Feodosia was a big port in ancient times as well as in the Middle Ages.

Kolli was able to prove that the ruins actually did go back to antiquity. A search of the sea floor in the area yielded fifteen large Greek amphoras. An analysis of the soils on the shore and from the sea bottom where the finds had been made convinced Kolli that they were identical. This was the first step in the search for traces of antiquity on the floor of the Black Sea.

It was not until half a century later that, with the invention of the aqualung, underwater archeology was able to develop on a wide scale. Beginning with the summer of 1957 Soviet underwater archeologists led by V. Blavatsky spent many years investigating sunken cities or parts of cities lying underwater. These cities are Hermonassa, Panticapaeum and Nymphaeum on the Kerch Strait, Chersones, an ancient city in the Crimea, near Sevastopol, and Olbia, a town situated a short distance from present-day Kher-son.

Olbia, meaning "Lucky", was founded by Greeks from Miletus on the shore of the Bug-Dnieper estuary at the end of the 7th century B.C. It was destroyed by the Huns in the opening centuries of the Christian era. Excavations begun in the 19th century are still going on. It has become clear, however, that exploration should be conducted under water as well, for more than half the area of the ancient city now lies there.

At the Chersones site, near Sevastopol in the Crimea, archeologists have found a section of the ancient city on the floor of the bay.

When archeologists began the excavation of Phanagoria, on the shore of the Taman Peninsula, they discovered that the city walls ran out into the Kerch Strait and that the main part of the ancient site lay under water. They have

found that the combined area, both under water and above water, would make Phanagoria the second largest city not only in the Bosphoran kingdom but throughout the Black Sea area in antiquity, only Panticapaeum (now Kerch), on the opposite side of the Kerch Strait, ranking larger. A submerged pier tells us that underwater archeologists may expect to make interesting finds at Kerch.

South-west of the ruins of Phanagoria lie the remains of another town that was famous in antiquity, known as Hermonassa, named after the wife of its founder. Today it is the town of Taman. Part of ancient Hermonassa, known as Tmutarakan in the Middle Ages, lies under water. The sea gradually undermined the steep shore and it crashed into the water along with the buildings standing on it. Underwater investigation of the ruins of Tmutarakan should yield interesting results, for that legendary city played a significant role in Russian history.

The ancient Greeks also established colonies on the Sea of Azov, among them Tanais, a port which they built at the mouth of the Don River in the 3rd century B.C. An earlier settlement, dating back to the end of the 7th century B.C., lies at the bottom of the Sea of Azov, in the area of present-day Taganrog. Underwater archeological discoveries in this area will be of paramount significance since it is now obvious that our notions of the extent and the period of Greek colonisation of the coasts of the Black Sea and Sea of Azov may have to be revised.

Geologists assume that the Sea of Azov once spread to the Caspian Sea and that the Crimean Peninsula was an island. Then the Sea of Azov shrank considerably exposing large areas of land

which since then have again been drowned. Since the Sea of Azov was known to the ancients as *Palus Maeotis* we have a right to give the name *Maeotis* to the land which its waters now cover. We may find not only the ruins of submerged and semi-submerged ancient cities but also drowned settlements and sites of primitive man at the bottom of the Sea of Azov. Here, too, we distinguish between the geological *Maeotis* and the historical *Maeotis*.

Exploration of the floor of the Bay of Sukhumi holds out even more exciting prospects. It was in this region, according to legend, that Jason and his Argonauts put in on their way to the land of Colchis in search of the Golden Fleece. The blessed land of Colchis bordered on the Black Sea, the *Pontus Euxinus*, as it was called then, one of whose chief cities, *Dioscurias*, was founded by the Greeks about 2,500 years ago. Legends claim that it was founded by the Argonauts themselves. The city minted its own coins. Ships from many lands called there, and peoples speaking dozens of languages and dialects came down to the city from the Caucasus Mountains to trade.

Where should the remains of this famous city and port be sought? Soviet archeologists have discovered a large number of towns, large and small, mentioned by historians of antiquity, along the Black Sea coast of the Caucasus. But it was underwater archeologists who brought the ruins of *Dioscurias* to light, for they lie at the bottom of Sukhumi Bay.

The first hint that they might be there came in the summer of 1876, when a student of local history named Vladimir Chernyavsky found a large number of archeological monuments be-

tween 60 and 100 metres from the shore and at a depth of only a few metres. From this he assumed that the ruins of glorious Dioscurias lay on the floor of Sukhumi Bay. But this assumption could be confirmed only many decades later. In 1953 underwater archeologists A. Apakidze and M. Trapsh found the remains of an ancient city, antique ornaments, coins, utensils and household articles there. In the same year Sukhumi Bay yielded a beautiful Greek marble relief by an unknown artist, dating back to the 5th century B.C. In technical execution and composition the relief is superior to any similar monument found on the ancient land of Colchis.

Two years later a bust that is about twenty centuries old, carved out of marbled limestone, was brought to the surface of the bay. After making a thorough study of the history of underwater finds and doing a great deal of scuba diving himself, archeologist L. Sharvashidze of Abkhazia compiled a map of the monuments of antiquity that had been found in Sukhumi Bay.

A survey of the bottom of the bay in the area of the mouth of the Besletka River was made in the summer of 1962 by a group of undergraduates from the Polytechnic Institute in Tomsk, Siberia. These amateur underwater archeologists, led by V. Pachulia, a great enthusiast of Colchis explorations on land and in the water, found traces of the necropolis of Dioscurias in the bay. They brought up a Greek tombstone, utensils used in burial ceremonies and a sarcophagus weighing more than half a ton. About 60 metres from the shore they discovered the ruins of a round tower some three metres in diameter and fortress walls.

The bottom of Sukhumi Bay shelves away very steeply. About half a kilometre from shore the depth exceeds one hundred metres, which is inaccessible to scuba divers. In the northwestern part of the bay, however, the sea bed slopes gently. The sudden drop in the bay prompts the thought that this could be the result of a natural disaster due to tectonic causes. Could a cataclysm have taken place here on the eve of recorded history? Abkhazian legends preserve vague memories of an earthquake and of a city that was established by newcomers and then swallowed up by the sea.

Perhaps, says archeologist L. Solovyov, another student of ancient Abkhazia, Dioscurias vanished beneath the waves when the shore subsided, or was buried in an enormous landslide. Further underwater exploration should clarify the matter.

Bulgarian researchers have compiled a detailed map of underwater archeological finds, dating from the 8th to the 5th centuries B.C., discovered along a large section of their country's Black Sea coast. Near the town of Sozopol, Bulgarian scuba divers and archeologists have found the remains of the ancient city of Apollonia. Pottery fragments brought to the surface show that there had been settlers in this place even before the Greek colonists appeared.

Now let us return to the Atlantic Ocean, where underwater exploration in the Caribbean Sea, unknown to the geographers of antiquity, is yielding a rich archeological harvest.

During a severe earthquake on June 7, 1692, Port Royal, on the southern coast of Jamaica,

a centre of English commerce in the New World, was engulfed by the Caribbean within a few minutes. Nearly nine-tenths of the city's territory vanished into the sea. Full-scale underwater excavation is now in progress there.

An earthen dam is being built up around the harbour, and gradually the town is emerging out of the water. Simultaneously, scuba divers are at work. Among the things they have brought up to the surface are Spanish coins, articles of pewter and glass, instruments, cooking utensils, tobacco pipes and even a silver watch which stopped at 11 hours 43 minutes, the time of the disaster.

This is only the beginning of exploration of the Caribbean area. The work may yield much of interest and perhaps lead to a re-examination of many questions relating to the settlement of America and the origin of pre-Columbian civilisations in the New World.

The indigenous population of the Antilles was completely wiped out by the Spanish conquistadors in a very short space of time. Underwater archeological exploration may tell us much more than ordinary excavations about the way Cuba, Haiti and other islands of the West Indies were settled. It may also tell us a great deal about the culture of the Indians who once inhabited the islands in the Caribbean Sea.

When they were discovered by Europeans the Indians of the Antilles were at a very low level of cultural development. Yet legends of the inhabitants of Central America, who built majestic palaces and temples, say that civilisation was brought to them from the east.

The earliest culture on the territory of Central America was that of the Olmecs, who lived along

the Atlantic seaboard. The Olmecs invented the calendar, hieroglyphic writing and the technique of building monumental structures.

The mystery of where the Olmecs came from may be solved when the floor of the Caribbean is explored. Marine geologists believe that a land mass, of which the Antilles are the remains, might have existed in the eastern section of the Caribbean. But on the other hand, they say it should have subsided very long ago, before the emergence of *Homo sapiens*.

Yet cataclysms such as the destruction of Port Royal are evidence that the earth's crust in the Caribbean area is not stable and that in our time, too, the sea can engulf a large town.

It is possible that underwater archeologists may find many interesting things on the floor of the Caribbean. Once again the phrase "it is possible" has cropped up, and this leads us to the question of the relative probability of various hypotheses being proved correct.

It is clear that the existence of a land mass in the region of the Polynesian islands or off the South American coast is much more doubtful than the existence of a Bering Land or a land bridge connecting the islands of Indonesia with the Australian continent—although some scholars believe that this bridge subsided forty million years ago, rather than 10,000 years ago, and that Australia could not have been settled overland.

And so, what is "indisputable", what is "probable" and what is "unlikely"?

EPILOGUE

IT IS INDISPUTABLE that submerged towns and hamlets lie at the bottom of the seas and oceans. Explorations now in progress in the Mediterranean, Caribbean, Azov and Black seas will lead to new discoveries. But all this work is being carried out in shallow coastal waters, on the shelves, and not in the ocean depths.

IT IS PROBABLE that primitive man reached Australia, America, parts of Oceania, the British Isles and many other islands by way of land bridges and islands that have since sunk.

IT IS UNLIKELY that in antiquity, after the glacial period, large sections of land inhabited by highly civilised peoples subsided into the sea. But it is NOT impossible. The history of science abounds in instances of the most fantastic and unlikely hypotheses turning out to be correct. (No one would believe that the ancient texts in the Linear B script that were found on Crete and on Mycenae were written in Greek, but this hypothesis proved to be right.)

It is up to underwater archeologists to verify the correctness of the various hypotheses. Until this is done we can only speak about the degree of their probability.

No traces of anyone crossing over into America many thousands of years ago have yet been found at the bottom of the Bering Strait or the Chukotsk Sea. In other words, although geologists and oceanographers have proved that there was once land in place of the Bering Strait, this land did not necessarily serve as a bridge between Asia and the New World. Hence, "historical" Beringia, as opposed to geological Beringia,

is only a hypothesis, although one which most Americanists support.

It is extremely likely, although not a proved fact, that man reached Australia via land bridges in the shape of islands and islets which have since disappeared. No traces of primitive man have as yet been found at the bottom of Torres Strait or the seas of Indonesia. The earth sciences show that the straits and seas were once dry land that combined Australia, New Guinea and Tasmania into a single whole, while the Indonesian islands were part of the Asian continent. Sahul and Sunda Land began to disintegrate about 40,000,000 years ago. Neither *Homo sapiens* nor his ancestors, the Neanderthal man and *pithecanthropus*, had appeared on the scene. A number of experts on Australia therefore do not believe that man reached Australia by land.

Most scientists today, though, are inclined to think that the coastal contours and the distribution of seas and land in that area were different in the last glacial period from what they are today. They also believe that, while there may not have been a single land mass, Australia may have been connected with the lands to the north of it by numerous islands across which man migrated. This hypothesis has a high degree of probability, but it is far from a proved fact.

There is much less certainty about the hypothesis of a land mass across which primitive man reached Tasmania and New Zealand, for land in that area started to subside many millions of years ago. Yet such a hypothesis would explain many of the riddles surrounding the indigenous population of Tasmania and the earliest inhabitants of New Zealand and the Chatham Islands. A land mass in the Tasmania area need not have

been a large continent; it might have consisted of sections of land, islands, reefs and mountains that would have helped man to reach the islands of Oceania.

The same applies to the Melanesian, Guyot, Hawaiian, Micronesian and Polynesian lands. The degree of probability that those sunken lands existed in the earliest human times, and the more so at the time when Oceania started to be populated, decreases in the order in which they are listed. The most probable hypothesis concerns Melanesia and the least probable Polynesia.

It is even more problematical that now sunken islands or continents existed during man's earliest dispersion or even after the Stone Age ended in some parts of the world and civilisation began to develop in Egypt, Mesopotamia, the Indus Valley, Asia Minor and on Crete. It is highly unlikely that they arose out of the earlier civilisations of Atlantis and Lemuria which sank into the Atlantic and Indian oceans, and even more unlikely that they originated in the "antarctic civilisation" which drifted towards the South Pole. That there was once a continent in the Pacific and that the Easter Island culture is all that remains of its civilisation is still more improbable.

But not, however, entirely impossible. Any hypothesis, no matter how farfetched, has a right to exist if its supporters are frank about how problematical it is and do not try to pass it off as the absolute truth, presenting circumstantial evidence and insufficient proof as trustworthy facts. This applies in equal measure to the earth sciences and the sciences that study man.

Contacts and interpenetration between these sciences are just beginning. Oceanography, ge-

ology and other earth sciences are accustomed to dealing with a time scale that cannot be compared to the time scale of the sciences dealing with man, whether history, archeology or even anthropology, which is now able to trace man's ancestors back for more than one and a half million years. But the very first underwater archeological investigations have helped to solve geological as well as historical problems, for example, the question of when sections of land subsided in the Black Sea and the Mediterranean.

Geologists and oceanographers have repeatedly turned to archeologists for help in dating changes in the appearance of our planet. Here is a typical example. Writing in the *Transactions of the Institute of Oceanology of the USSR Academy of Sciences* in 1951, V. Budanov presented convincing data that the coastline has slowly risen along the Pacific seaboard of the Soviet Union, leading to a decrease in the sea area. The decrease might also possibly be explained by a drop in the level of the World Ocean. The next step was to discover when the coastline changed and the rate at which the change took place.

These questions have been answered by Soviet geologist G. Ganeshin, using archeological data. The first Stone Age sites along the Pacific coast were discovered in the last century. Since then archeologists have found a large number of such sites at the edge of the Amur and Ussuri bays. At all of them there are huge heaps of seashells. Artifacts include potsherds, arrowheads made of obsidian, or volcanic glass, stone axes and other implements fashioned by Neolithic man.

It is natural to assume that these men settled along the coast and did not carry the shells they

collected inland. Yet piles of seashells have been found several miles away from the shore, not only on the plains but also on terraced ledges that are as much as ten metres high. Here archeologists have found the same artifacts, as along the shore, which indicates that the heaps were made by the same people. From this, geologist Ganeshin has concluded that the Neolithic settlements lying inland, but with the same piles of seashells, the remains of meals eaten thousands of years ago, once stood on the coast. The sea receded, leaving the settlements far removed from today's coastline.

When did the people who left those heaps of seashells live along the Pacific coast? The well-known Soviet archeologist A. Okladnikov places their culture in the Neolithic period. Ancient chronicles mention the Sushen and Ilou tribes which lived on the coast. They could have been the "seashell" peoples. The fact that they lived there between 3,000 and 4,000 years ago indicates this was the period when the lowlands of the Pacific coast began to take shape. Geological data on the height of the coastal plains, combined with archeological and historical data about the period since the plains began to develop, enable us to determine that the western coast of Amur Bay receded at a rate of three to seven centimetres per century. A terrace one to two metres high was formed over the course of the 3,000 to 4,000 years.

The sciences about man are helping to resurrect the geological history of the Japanese islands in a similar way. Neolithic settlements on the Sea of Japan and the Pacific coast were as a rule situated along the edges of bays and coves. But ten, twenty and even twenty-five kilometres

inland archeologists are finding sites similar to these "seaside" settlements. The Japanese geologists R. Toki and K. Oyama have shown from archeological as well as geological data that there was once a large bay in place of the Kanto plain in the area of modern Tokyo. The bay gradually shrank as the ocean retreated; the coves silted up with river sediment. Neolithic sites mark the outlines of ancient bays. The nearer we come to the contemporary shoreline the younger the pottery and other artifacts of people of the New Stone Age. These sites are unique landmarks in time not only for archeologists but also for geologists and oceanographers.

Archeology, say the experts, has greatly assisted the natural sciences by giving them another dimension, time. Archeology has made it possible to study physical and other phenomena that took place 1,000, 10,000, 100,000 or 1,000,000 years ago. There is no doubt that oceanography, in its turn, is giving archeology more and more help all the time. Archeology should be able to develop a more precise and differentiated scale for measuring time. If the remains of ancient structures or other traces of human activity are discovered in the shelf zone, or on the ocean floor, geologists and oceanographers will have to revise many of the dates of land subsidence in various parts of the world.

There is no unanimity among scientists, whether oceanographers, geologists or geophysicists, concerning the important question of the origin and age of the oceans. Many authoritative researchers, both abroad and in the Soviet Union, assume that all the contemporary oceans are "primary" and arose more or less when the

crust of our planet was formed, which would be between 3,500 and 4,000 million years ago.

Over such a colossal period of time there have naturally been changes in the shape of the oceans. Still, say champions of the "oceans came first" theory, those changes were not so great that there should have been countries above the water where there are now countries under the water, to say nothing of entire continents such as Gondwanaland and Atlantis and a continent in the Pacific. It was not the oceans that engulfed those continents, they say, but the land that attacked the oceans.

A number of prominent scientists in the Soviet Union and abroad believe, however, that the process was two-sided: the oceans could have engulfed land, and land could have occupied space now covered by the waters of oceans.

The Mesozoic era began about 225,000,000 years ago and ended 70,000,000 years ago. It was followed by the Cenozoic era, at the end of which man appeared on earth, in the Quaternary period, between one and a half and two million years ago. Some geologists and oceanographers think that this was the period when the planet and its oceans took final shape. However, they do not have any exact dates.

The folklore of the most diverse peoples preserves legends of deluges and other cataclysms in which seas and oceans engulfed hamlets, towns and large land masses. How far back in time do these legends go? Is the human memory capable of handing down from generation to generation evidence of events that took place 300, 500, 1,000 or 10,000 years ago?

A legend told in a tribe living in southeastern Australia describes how Macdonnell Bay arose.

There was a time, says the legend, when the strait was land covered with beautiful meadows and woods. But then an evil witch stirred up the sea, and water drowned the land, turning it into a bay. Oceanographic and geological data confirm the truth of the legend. Land really did exist there during the Ice Age. But at least 10,000 years have passed since the end of the last glaciation.

Polynesian legends about the destruction of a large land mass in the Pacific Ocean are even more astounding. According to oceanographers and geologists, large sections of land there sank very long ago, before *Homo sapiens* appeared on the scene. But perhaps the latest changes in the relief of the Pacific were witnessed by human beings, inhabitants of the islands of Oceania. Perhaps the sciences dealing with man will provide new dates which differ from those furnished by geology and oceanography.

Here is a pertinent example. A skull found in Australia, not far from Melbourne, was first dated by geologists as being from 100,000 to 150,000 years old. Anthropologists disagreed with this since it ran contrary to all their data. When Australian geologist E. Gill re-examined the matter, he discovered that the anthropologists were right. The terrace in which the skull lay was formed between 15,000 and 18,000 years ago.

It used to be thought that the earth sciences possessed indisputable data. However, oceanography and geology are both developing so rapidly today that many seemingly settled questions are being revised. Substantial changes may soon take place in one of the cardinal questions of geology and oceanography—the dating of events that have changed the face of our planet.

Sciences about man will, in their turn, "increase" the age of the first human settlements and the earliest civilisations. Investigations by the English anthropologist Leakey have almost doubled the age of man's ancestors. Today it is considered proved that they appeared on earth 1,700,000 years ago. It is possible that future discoveries by underwater archeologists will compel both sciences about the earth and sciences about man to revise some of their dates. Geologists and oceanographers will bring events closer to our time, while anthropologists, ethnographers, historians and linguists will produce earlier dates than before. Eventually, the gap between geological history and human history may not be so great as it is thought to be today.

If reports of the discovery of an undersea city deep in the Pacific, off the coast of Peru, turn out to be true, this will mark a new era in underwater archeological research. Bathyscaphes and other submersibles will then be used by archeologists as well as by marine biologists and geologists. It is quite possible, though, that ancient peoples inhabited only what are now coastal shallows, while the continental slopes and deep-water oceans and seas were never "inhabited", so that no traces of man's presence will be discovered there.

Yet scientists can look forward to many discoveries in their exploration of shallows. Experiments begun by French, American and Soviet researchers are promising. These researchers are making themselves familiar with coastal shallows and are creating a "*Homo aquaticus*" for whom life and work underwater will be natural. We are as proud of oceanauts as we are of astronauts. Read, for example, *World Without*

Sun, a book in which the famous Jacques Yves Cousteau describes the month-long underwater life of eight oceanauts. Researchers of this kind will undoubtedly discover many traces of ancient man's presence in the zone of shallows. "*Homo aquaticus*" will make underwater archeological excavations as common as archeological excavations on land.

The ancient cities found on the sea floor, the sunken vessels with valuable cargoes, treasure on the floor of lakes, and settlements of primitive man now engulfed by the sea have all been discovered either accidentally or because old chronicles and annals mentioned a city or country that was destroyed by the sea. But what if there are no historical documents, or there was simply no one to leave them because all the people in a town or country perished? Are we to trust luck, or should we seek a way of carrying on a purposeful underwater search?

Underwater archeology is an applied science, as it were. Scientists have developed special methods of conducting excavations underwater. Engineers have designed gear for underwater archeologists and are developing more and more new equipment. All this belongs to the sphere of the practical; it is part of the applied science of underwater archeology. Today, however, a new science is coming into being in the border area where the sciences about man and the earth sciences overlap. It is the science of *where* archeologists should search, and *what* they should search for, on the floor of bays, seas and oceans.

Archeology, ancient history, ethnography, linguistics, anthropology and other sciences about man abound in blank spots. And when oceanog-

raphy, geology and other earth sciences speak of land subsidence, earthquakes or other natural cataclysms in some area that was inhabited by an "enigmatic people" or had a "mysterious civilisation" (meaning the earth's crust there is highly active), it is legitimate to advance the hypothesis that data furnished by these sciences can explain questions to which the sciences about man have no answers.

What name can be given to the new branch of science? "Theoretical underwater archeology" would be quite a mouthful. Besides, this discipline deals only with *hypotheses* (which may prove to be wrong) and not with theories that have been proved and developed, that are based on a firm foundation of fact. The name "Atlantology" or "scientific Atlantology", perhaps? But that would narrow the term too much, for the discipline deals with much more than Plato's Atlantis. Besides, the term "Atlantology" has been greatly discredited by unscientific Atlantologists or, rather, Atlantophiles, who have advanced hasty conclusions based on doubtful and outdated facts or, sometimes, simply on inventions.

A search for the rational kernel (if it exists) in legends and in what Plato wrote is naturally one of the tasks confronting the new discipline, which is literally still in its infancy. But this is only part, or the main part, of its work. A much more important job is coordination of the archeological, geological, historical and oceanographic dates, for in most cases there are gaps measuring thousands, if not millions, of years between the dates furnished by the sciences about man and those given by the earth sciences.

What about "acquaarcheology", or "hypoquaar-

cheology", meaning hypothetical underwater archeology? Both are too clumsy.

Soon, however, a researcher, whether an archeologist, ethnographer, historian, geologist, oceanographer or folklorist, will probably coin just the right name—short, vigorous and precise. What's in a name, after all? It is now obvious that hypotheses concerning drowned lands may be extremely useful in exploration of the floors of seas and oceans, both to the scuba divers of today and to the oceanauts of the near future.

Take the example of Khazaria, a "Russian Atlantis" on the bed of the Volga and the Caspian Sea. Archeologists have worked hard to unearth traces of the Khazar culture, of Khazar cities, fortifications and dwellings, but without any success. Although Itil, capital of Khazaria, is mentioned in chronicles as having been a large and well populated city, with a palace surrounded by a thick wall, no trace of it has been found anywhere along the Volga. Nor had any traces of the Khazars come to light. They had vanished as though the earth had opened up and swallowed them.

Perhaps not the earth, though, but water. That was the hypothesis advanced by the prominent Soviet historian Professor L. Gumilev. The ruins of Khazar towns and hamlets, including Itil, the Khazar capital, lie at the bottom of the Volga and the Caspian, he declared. When the Khazar state was in its heyday, he said, the contours of the Caspian Sea were different and the Volga delta covered a far smaller area.

Professor Gumilev searched for traces of the land of the Khazars, or the "Volga Atlantis", for several years. Finally a Khazar grave was found on the slope of a hillock in the Volga

delta. When the level of the Volga was at its highest, in the 14th century, the mound was an island. Khazar potsherds were brought up by dredges from the bottom of the Volga, at a depth of thirty metres, in the middle of the delta. This seemed to confirm the hypothesis of a "Russian Atlantis".

But a number of Soviet scientists do not think the potsherds have anything to do with the Khazar culture. Academician Rybakov, for example, believes that the Khazars were a nomad people and hence did not leave any traces of hamlets, to say nothing of towns. Such traces cannot be found simply because the nomad Khazars had no permanent settlements (and not because they might have been drowned). Khazaria, the "Russian Atlantis", is a hypothetical country, these scientists say, admitting, however, that there are a few facts which speak in favour of Gumilev's theory.

Once again, for the nth time, we come up against the "probable" and the "hypothetical". To be sure, though, these concepts are just as applicable to conventional archeology as they are to underwater archeology, and also to many other sciences that study man's remote past. There are far too many riddles in human history and prehistory to allow us to draw any categorical deductions and conclusions, even about peoples and civilisations which have been thoroughly studied. The history of the ancient world, which seemed quite clear to scholars of the 19th century, has had to be revised following the discovery of the civilisations of Crete and the Greek language of the Linear B script.

IT IS INDISPUTABLE—and even the most sceptical researchers agree—that the ruins of

ancient hamlets and towns lie in the coastal waters of oceans, seas, bays and river deltas. Every year brings new discoveries as underwater archeologists find and study traces of man's presence in places now covered by water.

IT IS PROBABLE that land bridges helped primitive man to disperse and to settle many islands, and even continents. But there is no direct proof of this. For that reason, many scientists assign Bering Land, Melanesia Land and other sunken regions to the geologists and oceanographers, feeling that they in no way influenced human migration. Here we are in the field of hypotheses that have varying degrees of probability.

IT IS HIGHLY IMPROBABLE that big land masses, inhabited by large numbers of people who created ancient civilisations, ever existed in the Indian, Pacific or Atlantic oceans. Still, there is a chance, unlikely though it may be, that the hypothetical Pacific continent, Lemuria and Atlantis once existed.

Let us wait and see what underwater exploration brings to light.

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